

NOHRSC Overview

Carrie Olheiser

Operations Manager & Chief Snow Survey

National Operational Hydrologic Remote Sensing Center

Office of Hydrologic Development

National Weather Service, NOAA

U.S. Department of Commerce



A Weather-Ready Nation

National Weather Service Strategic Plan

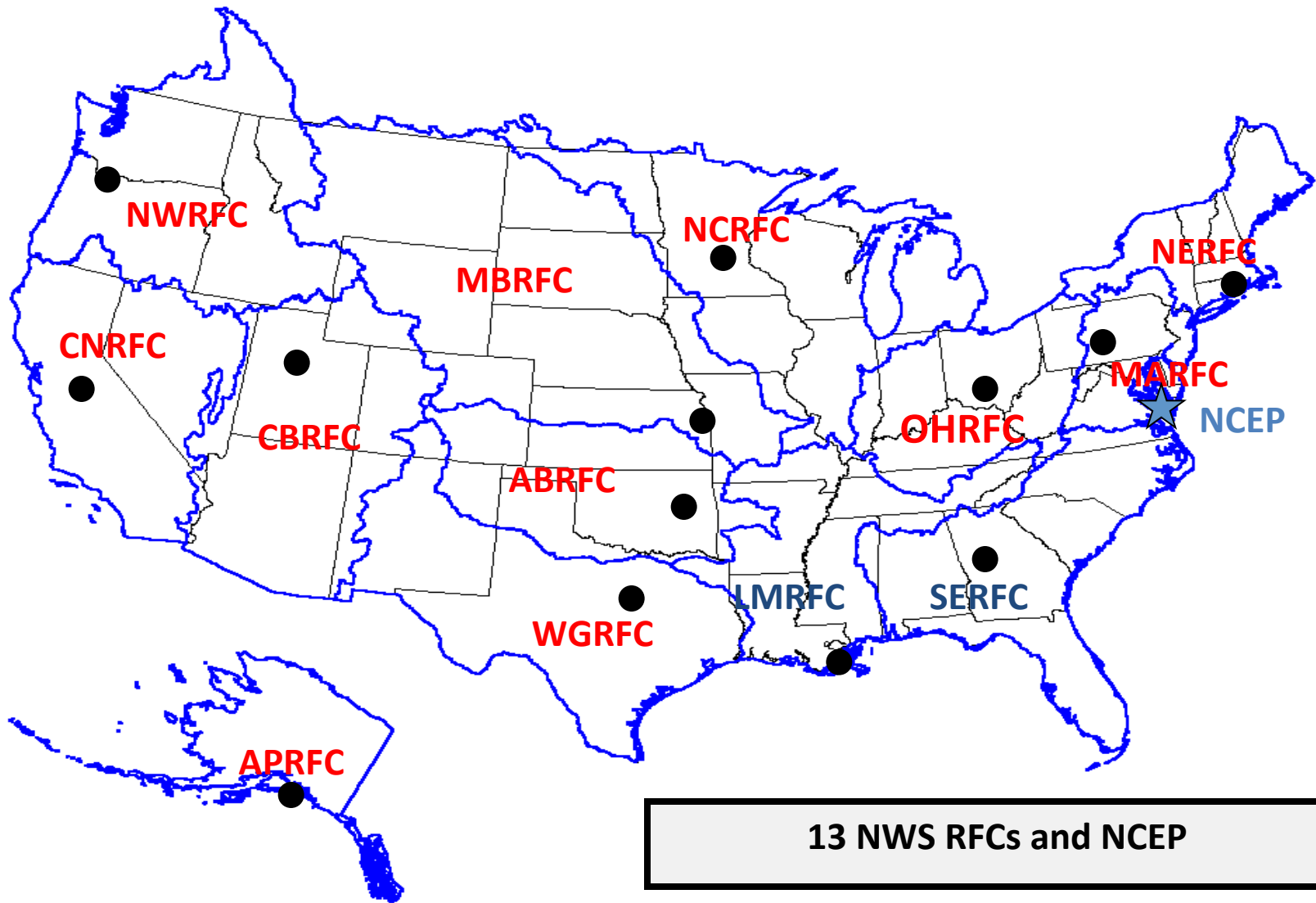
NOHRSC Mission

To support the National Weather Service's mission by producing the best estimate of snow water equivalent using all available data including satellite, airborne, and in-situ observations to protect life and property and the enhancement of the national economy.



NOHRSC

NOHRSC NWS Clients



Stakeholders

National Weather Service

- **13 River Forecast Centers**
- **Weather Forecast Offices**

Federal and State Agencies

- U.S. Army Corps of Engineers
- Bureau of Reclamation
- New York Department of Environmental Protection
- Natural Resources Conservation Service
- Department of Transportation
- Montana Department of Emergency Services
- San Francisco Public Utilities Commission
- University of Albany ASRC/CESTM
- University of Wisconsin Sea Grant Institute
- National Snow and Ice Data Center
- FEMA

Private Sector

- **Baron Advanced Meteorological Systems, LLC**
- **Weather Channel**
- **Meteorlogix, Inc.**
- **Merrril Lynch**
- **Weather Decision Technologies, Inc.**
- **SnowStreet**
- **AccuWeather**
- **Snow Plow Operators**
- **Oppenheimer**
- **Campbell Soup Company**
- **Snowmobile outfitters**
- **Mountaineers**
- **General Public**

Canadian

- **Manitoba Department of Natural Resources**
- **New Brunswick Department of Natural Resources**
- **Alberta Environment**
- **BC Hydro**
- **British Columbia Ministry of Environment**
- **Environment Canada**
- **Saint John River Basin Commission**

National Snow Analysis

Multi-sensor Snow Observations

Ground

Airborne

Satellite

Snow Modeling and Data Assimilation

Numerical Weather
Prediction Model
Forcings

Gridded Snow
Characteristics

U.S.
1-km²
Hourly

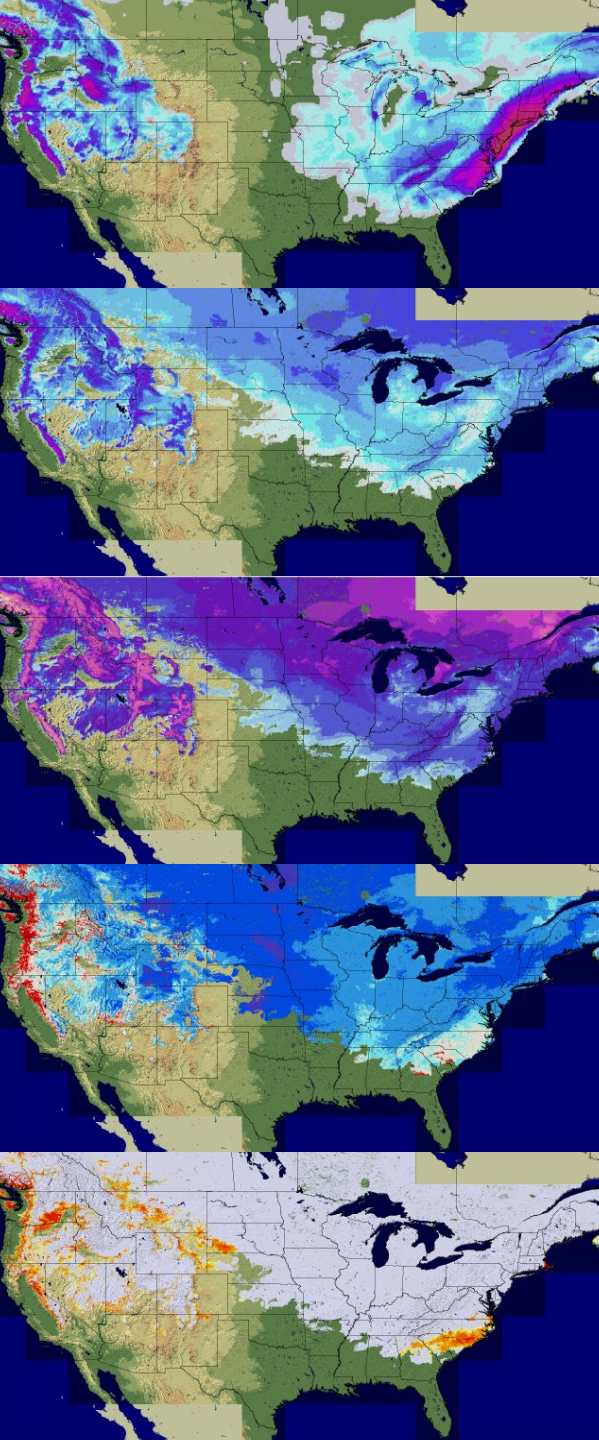
Snow Information Products

Data Products

Interactive Maps

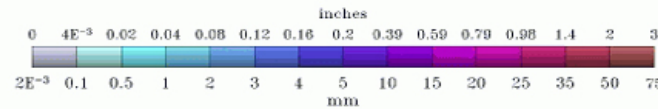
Time Series Plots

Text Discussions



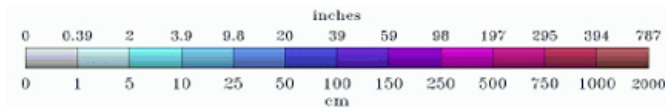
Snowfall

24-Hour Total Ending 2006-02-21 06 UTC



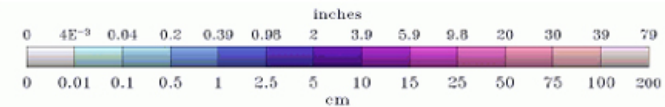
Snow Depth

2006-02-21 06 UTC



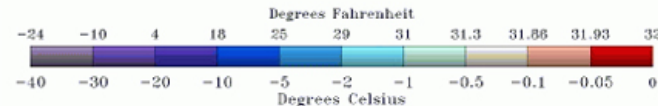
Snow Water Equivalent

2006-02-21 06 UTC



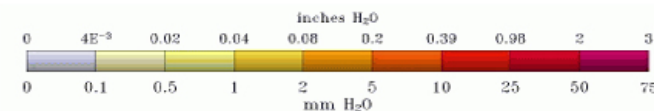
Snowpack Temperature

24-Hour Average Ending 2006-02-21 06 UTC



Snow Melt

24-Hour Total Ending 2006-02-21 05 UTC



PRODUCTS

- Hourly and Daily
- 1 km² Resolution

INTERNET

- Interactive Maps
- 3D Visualization
 - e.g. Google Earth
- Time-series loops
- National/Regional Discussions
- Text summaries by watershed
- Point Queries

DIRECT FEED

- Push or Pull
- Gridded Data
- Flat Binary or GIS-ready

National Snow Analysis

Multi-sensor Snow Observations



Ground

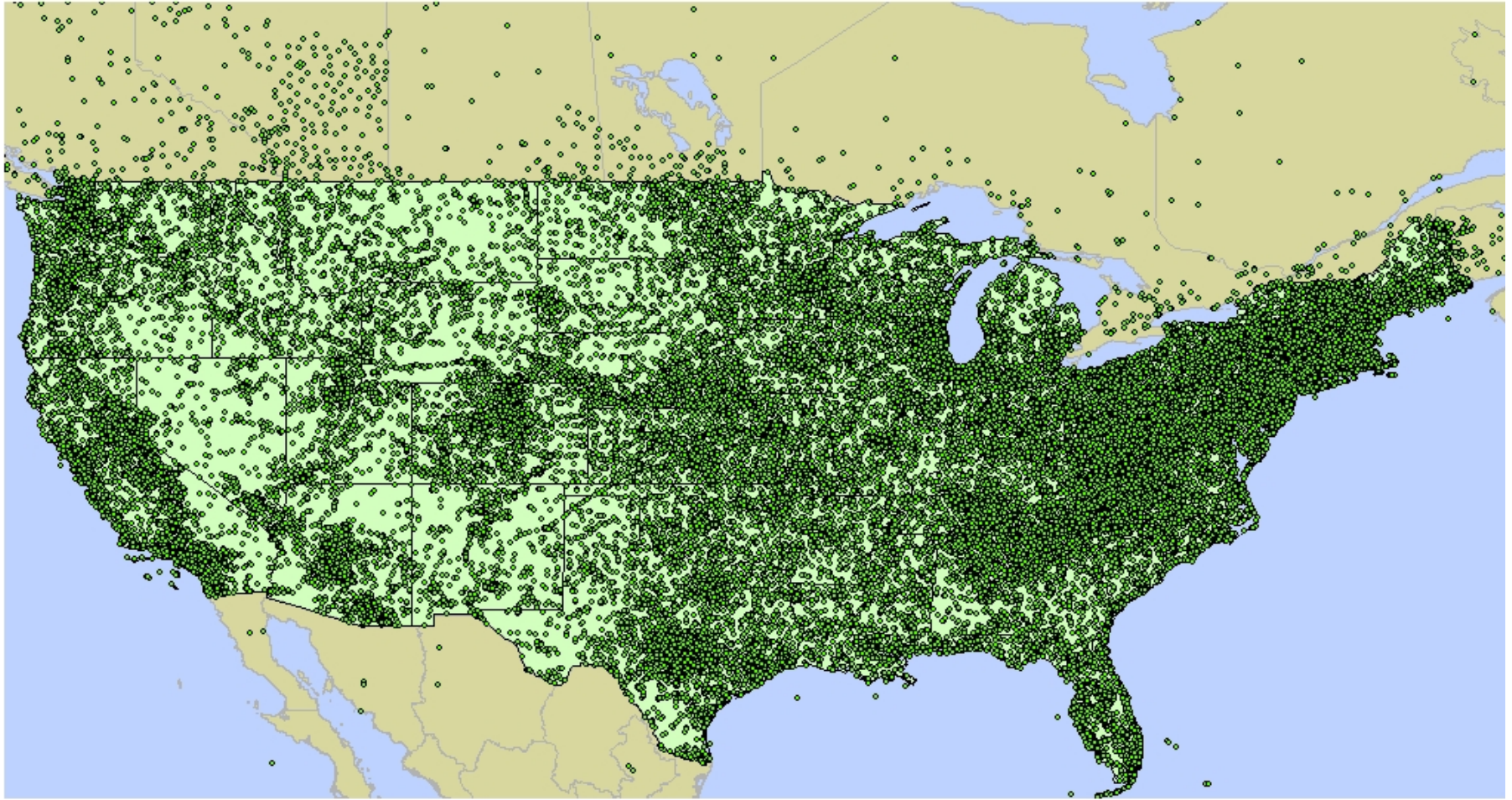
Airborne

Satellite

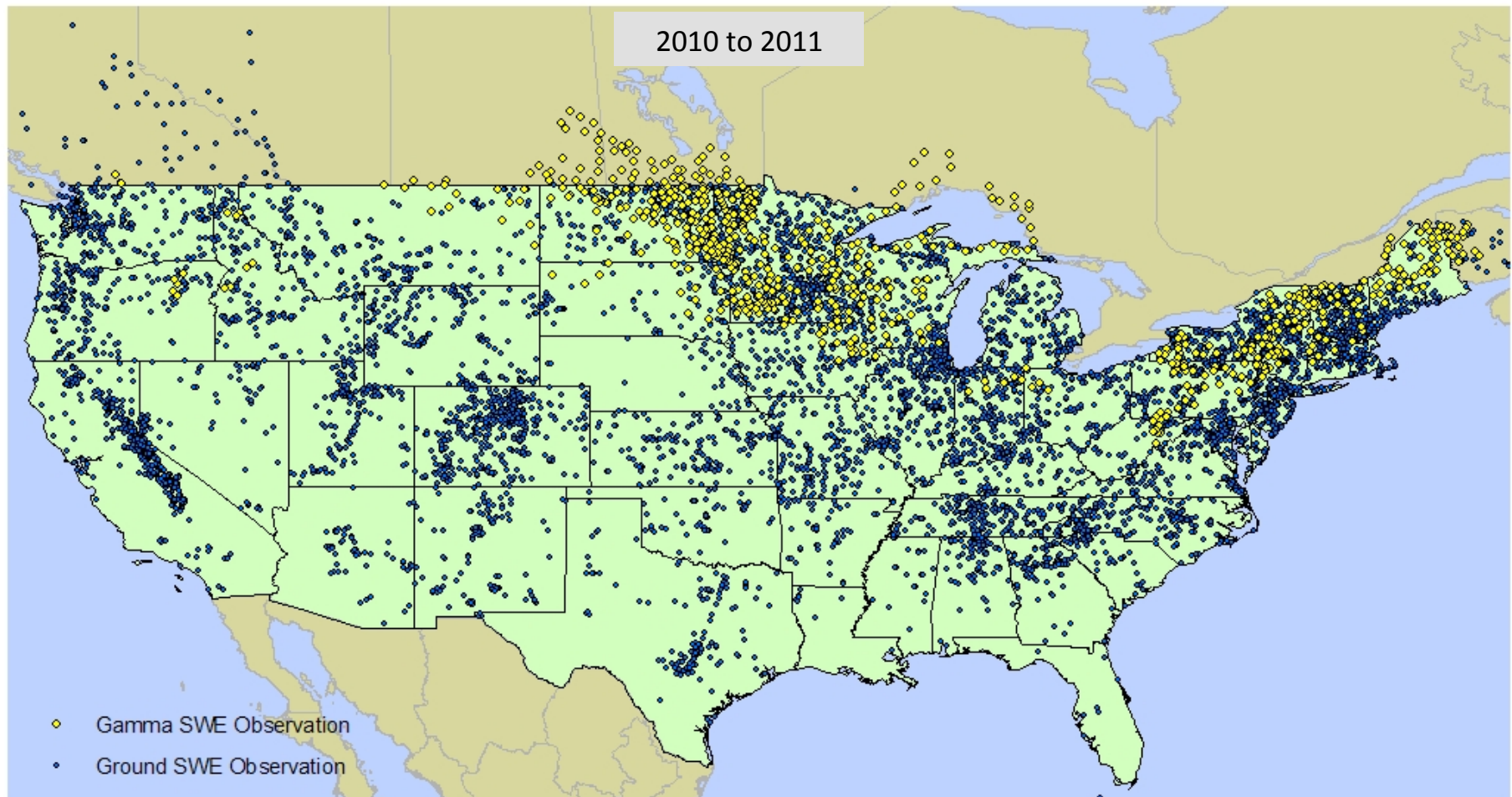
- **National Weather Service**
 - First-order Stations
 - Cooperatives
- **Federal and State Agencies**
 - NRCS SNOTEL and Snow Courses
 - USACE New England District Snow Surveys
 - Federal Aviation Administration
 - California Dept. of Water Resources
- **Regional Mesonets and Surveys**
 - State Mesonets
 - CoCoRAHS
 - MesoWest (150 smaller mesonets)
- **International Agencies**
 - St. John River Basin
 - Environment Canada
 - BC Hydro

Over 50,000 Current Reporting Stations / over 125,000 in NOHRSC database

All Reporting Stations

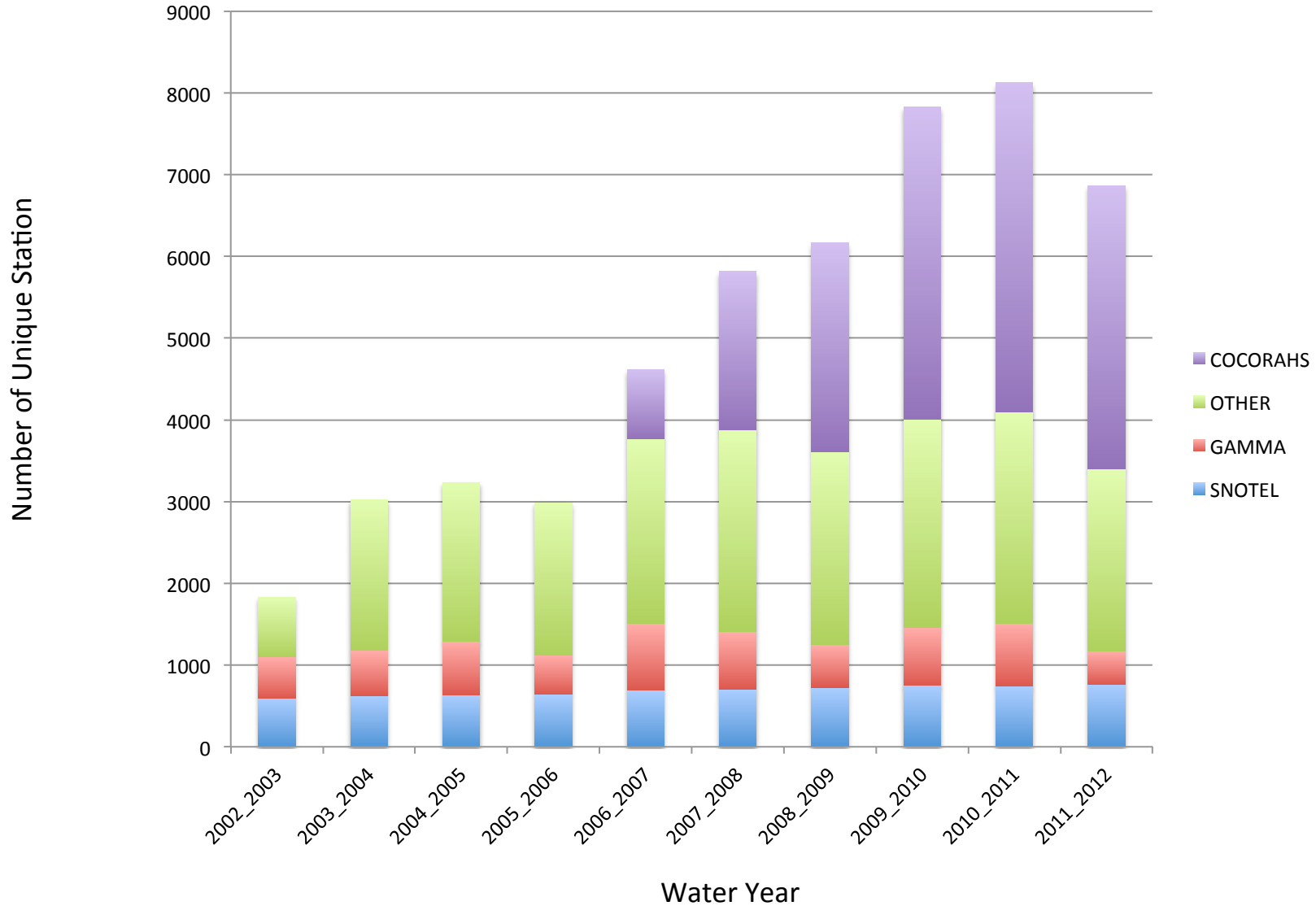


SWE Reporting Stations



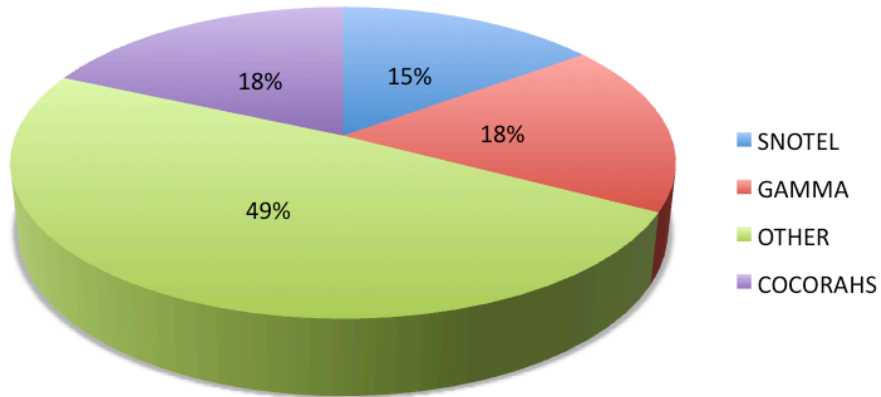
In 2012 NOHRSC received 6,370,790 SWE observations
And 8,234,088 Snow Depth Observations

Snow Water Equivalent Stations

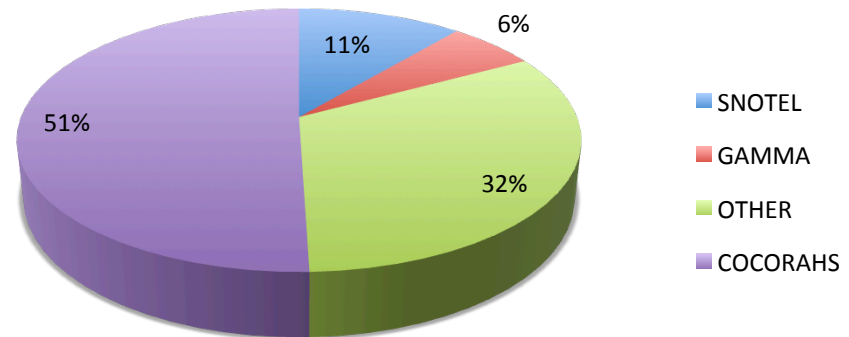


Snow Water Equivalent Stations

Unique SWE Stations 2006-2007



Unique SWE Stations 2011-2012



- NOHRSC started ingesting CoCoRaHS data in 2006
- Since 2006 the number of SWE stations has increase from ~4000 to more than ~8000 stations.
- The total contribution of SWE reporting stations from CoCoRaHS has increased from 18% to 51% !

National Snow Analysis

Multi-sensor Snow Observations

Ground

Airborne

Satellite

NWS Airborne Snow Survey Program



- **Snow Water Equivalent Measurement**
 - Attenuation of natural terrestrial gamma radiation by water in snow

National Snow Analysis

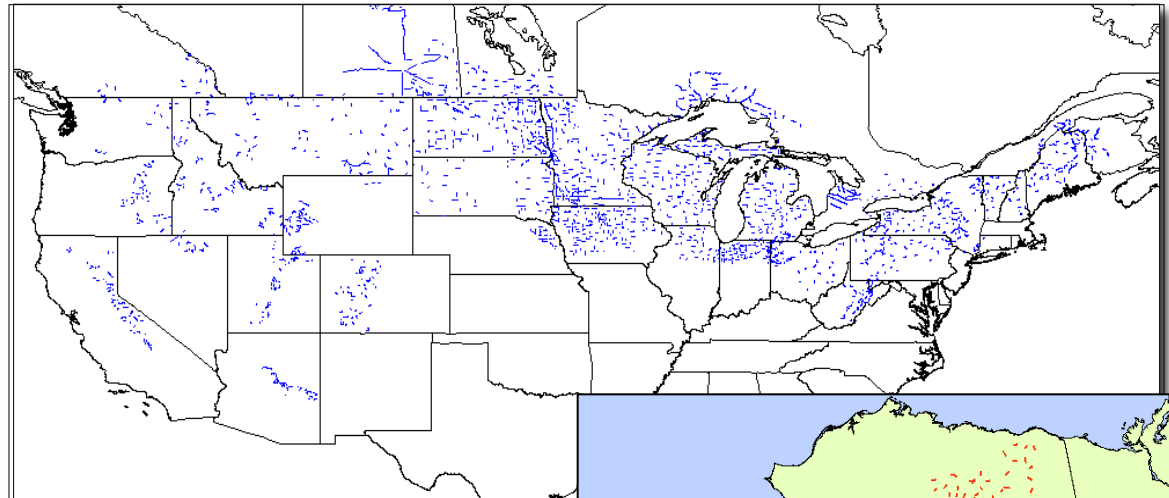
Multi-sensor Snow Observations

Ground

Airborne

Satellite

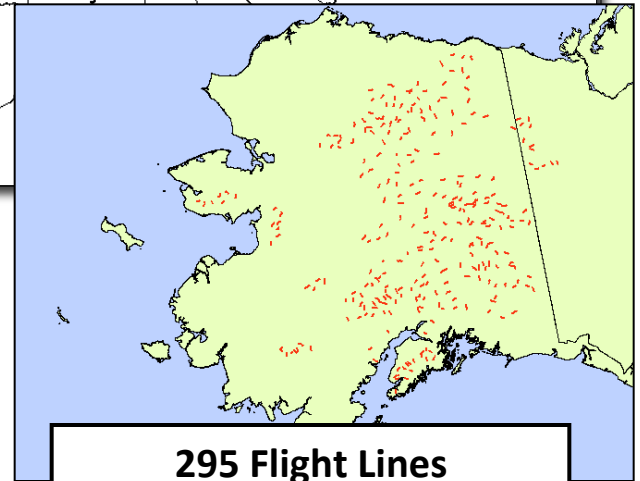
Airborne Snow Survey Program Flight Line Network



2,478 Flight Lines

37 States, 9 Provinces

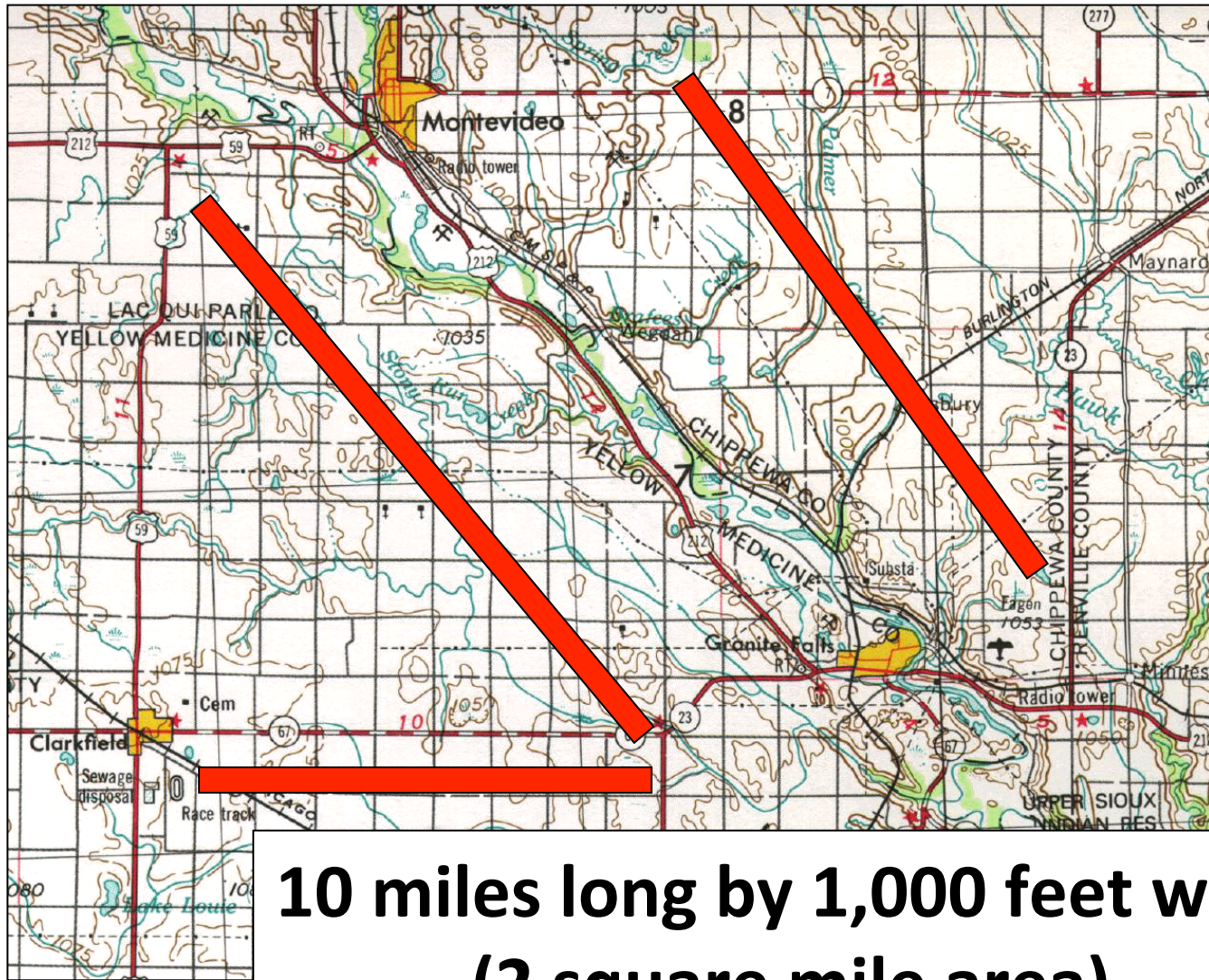
- Integrated SWE over $\sim 5 \text{ km}^2$ (robust mean)
- Sample over elevation range
- Upper SWE limit $\sim 1 \text{ m}$



295 Flight Lines

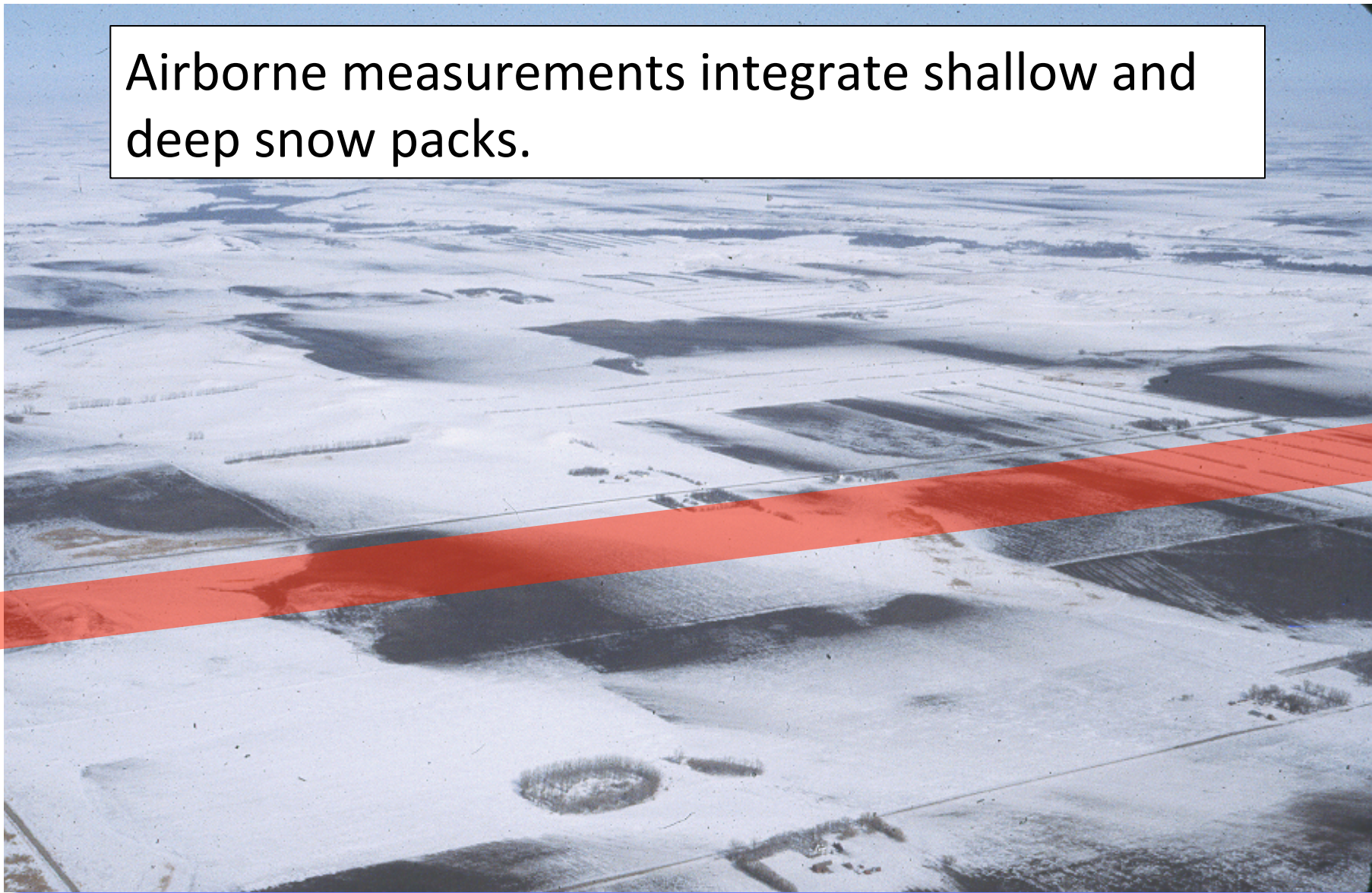
Added 104 lines Summer of 2006

Typical Flight Line

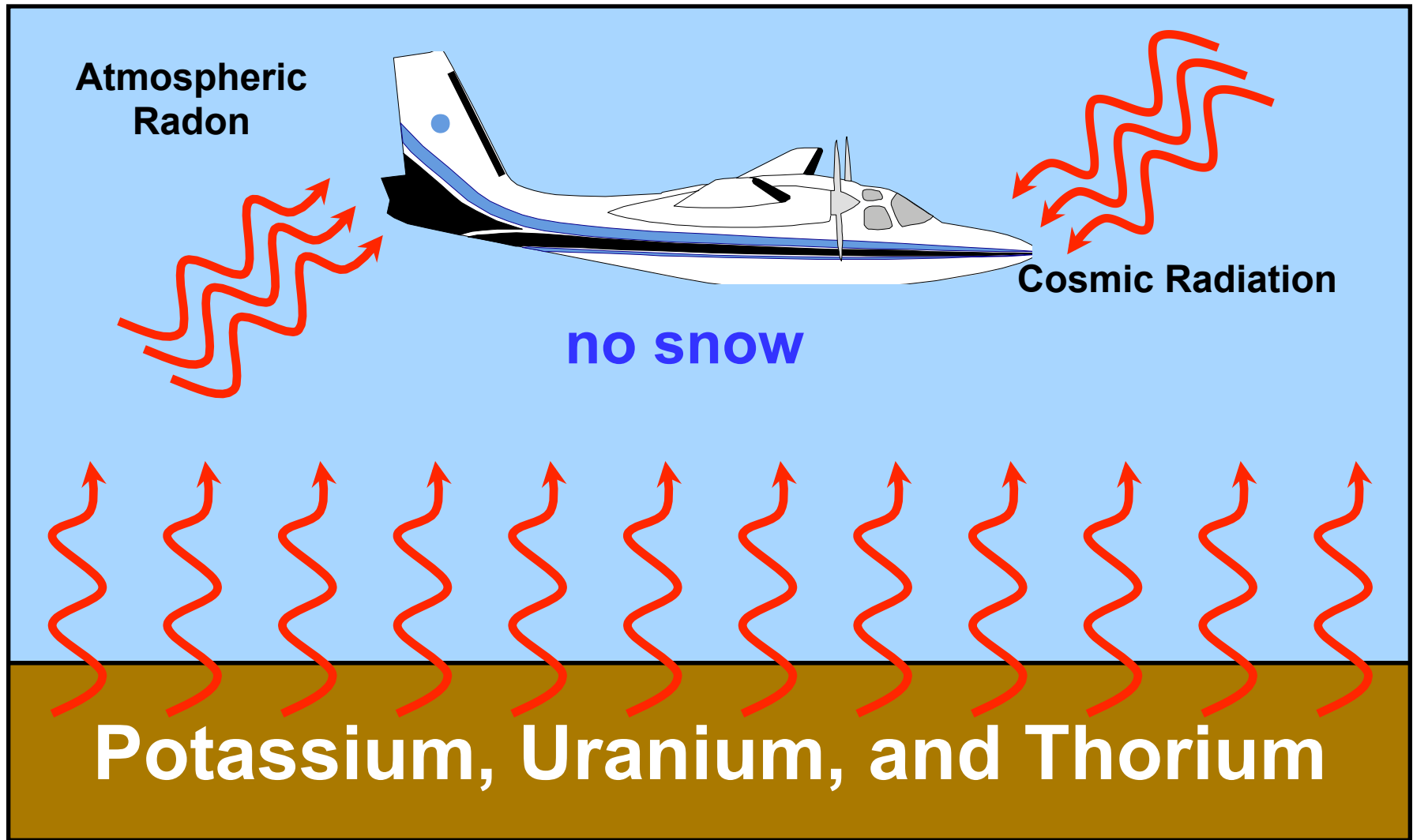


**10 miles long by 1,000 feet wide
(2 square mile area)**

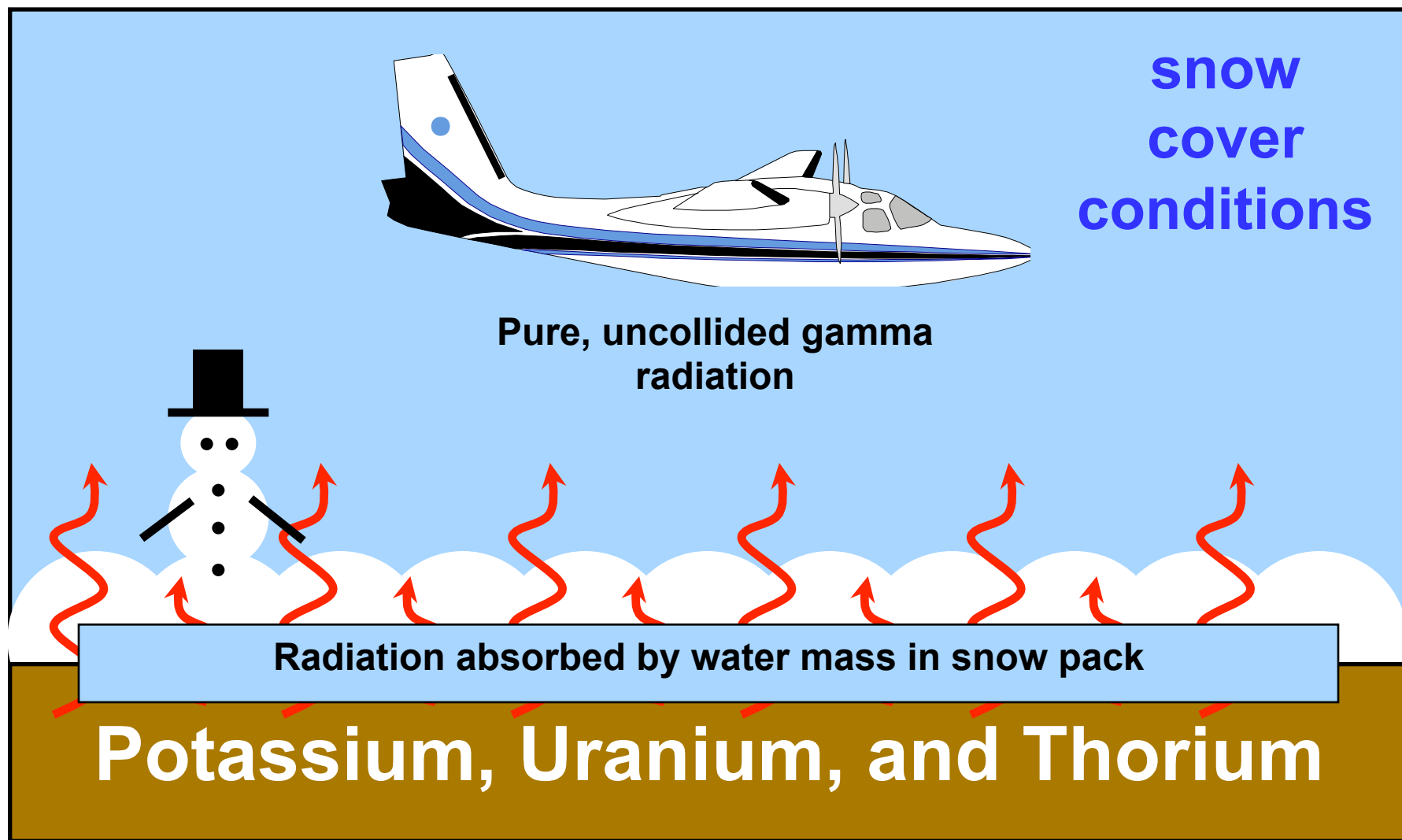
Airborne measurements integrate shallow and deep snow packs.



Natural Terrestrial Gamma Radiation



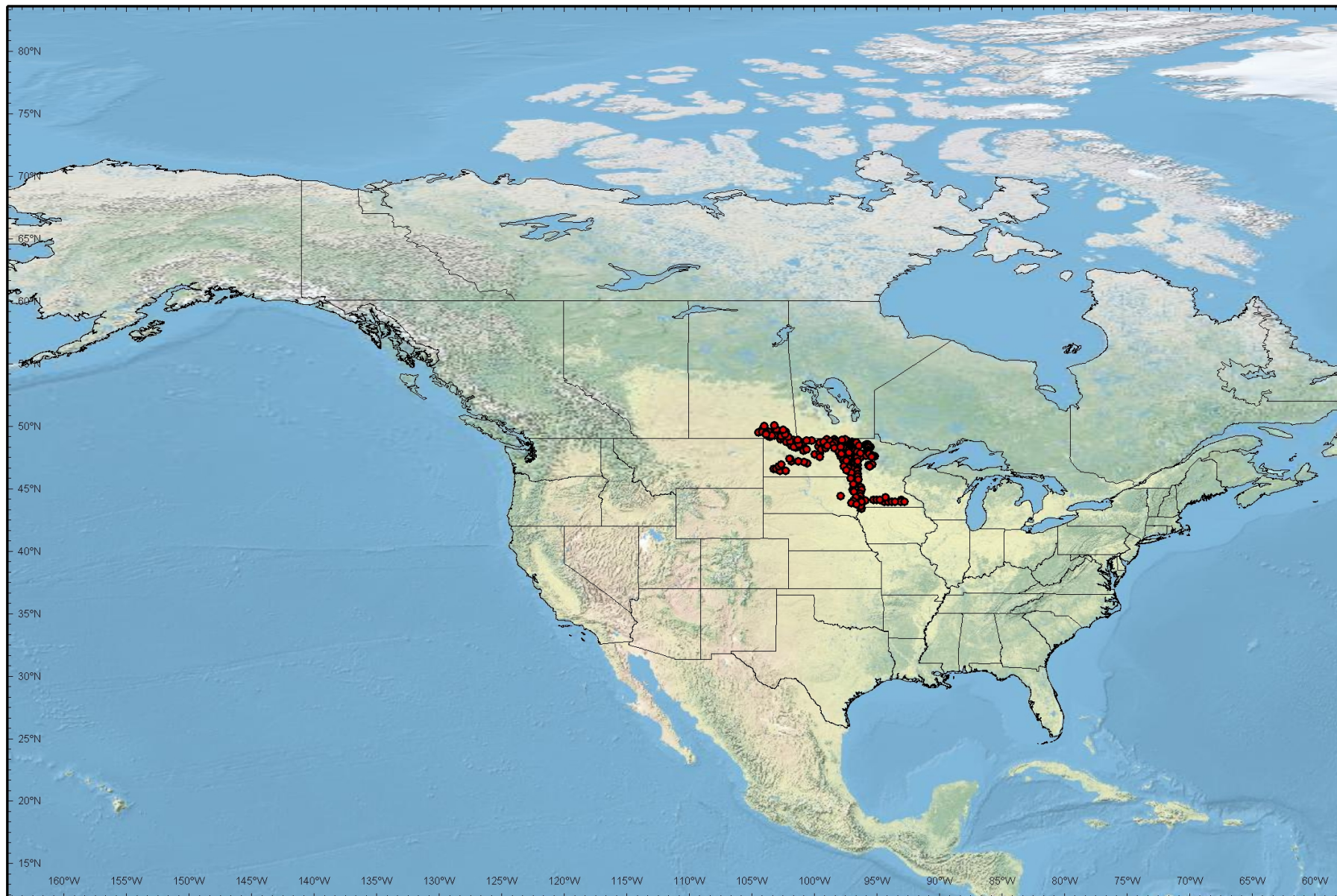
Natural Terrestrial Gamma Radiation



Ground ice 2 to 4 inches thick also acts like snow water equivalent.



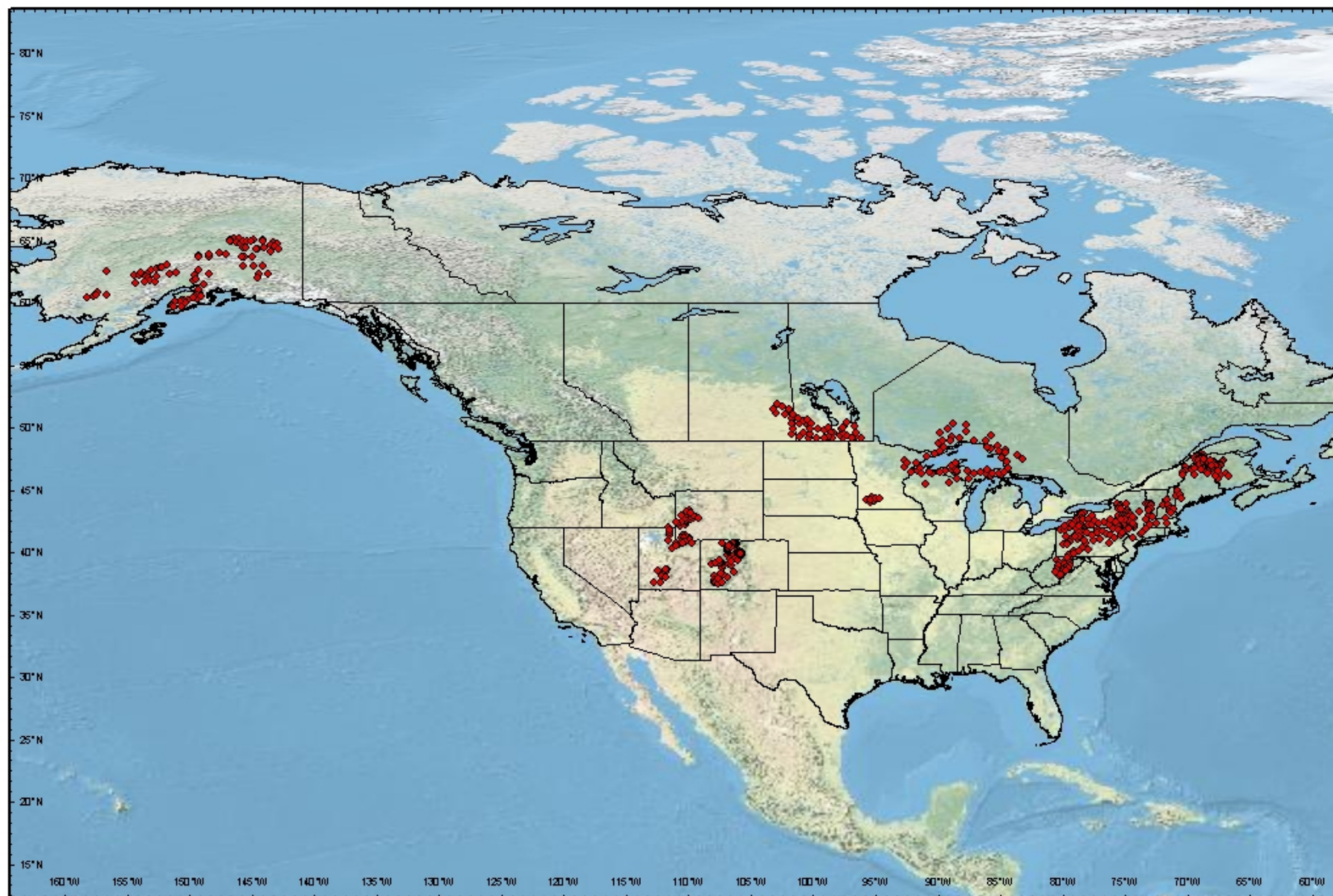
Gamma Flightline Data 1980-10-01 to 1981-10-01



0 165 330 660 990 1,320 Miles



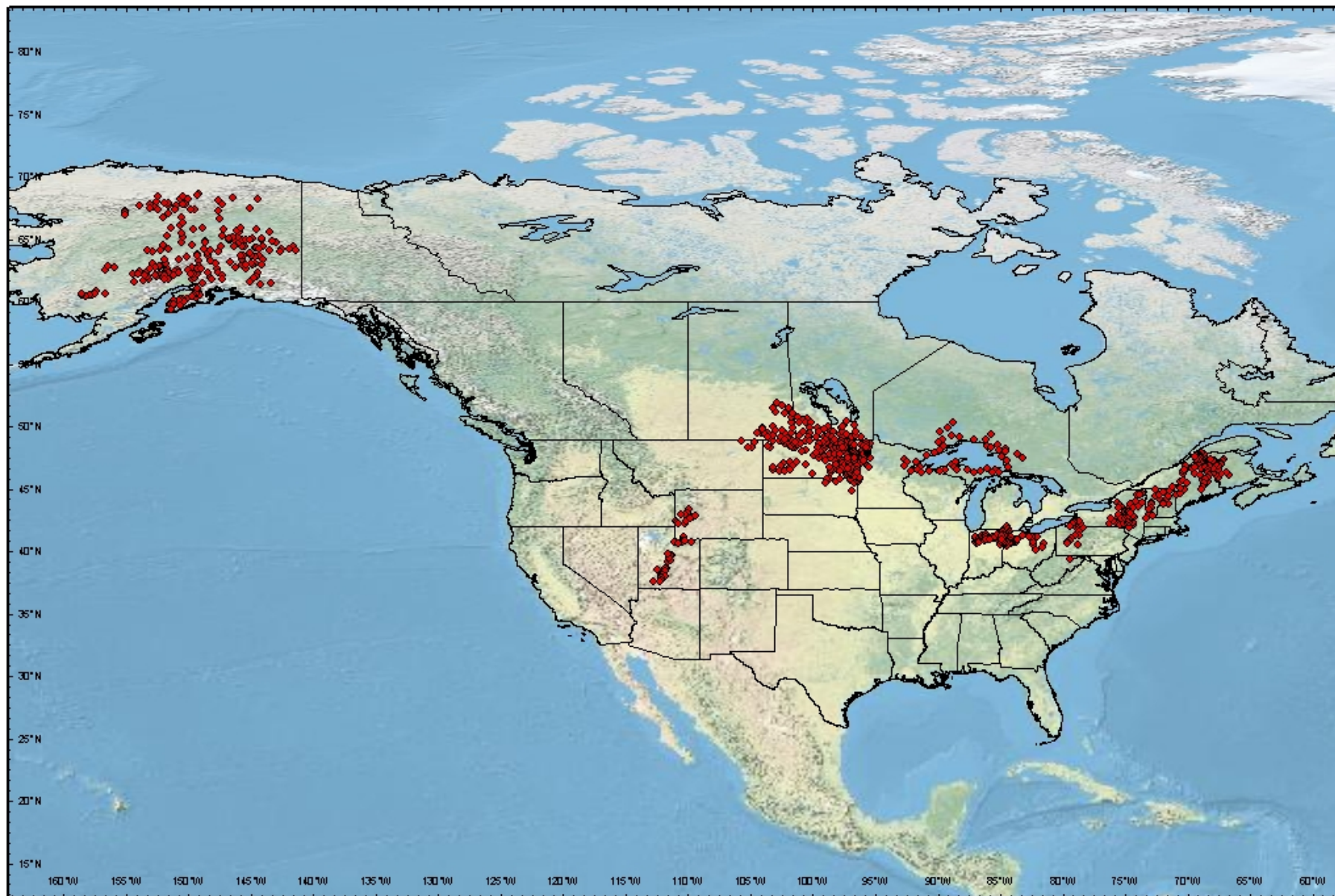
Gamma Flightline Data 2002-10-01 to 2003-10-01



0 165 330 660 990 1,320 Miles



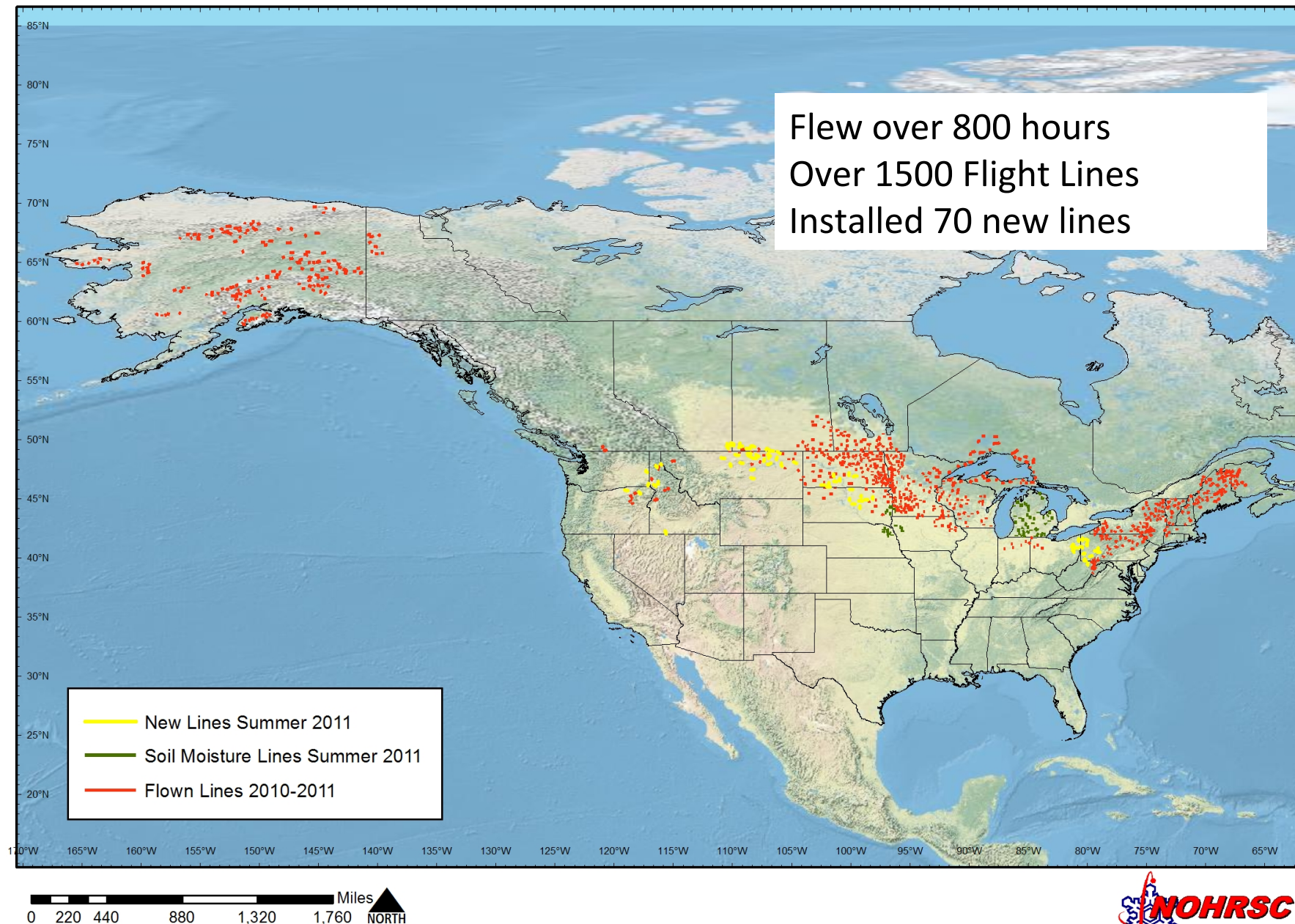
Gamma Flightline Data 2008-10-01 to 2009-10-01



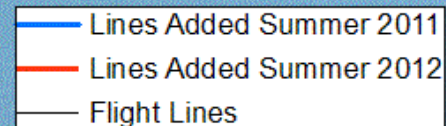
0 165 330 660 990 1,320 Miles



Gamma Flight Line Summary 2010 - 2011



Airborne Snow Survey

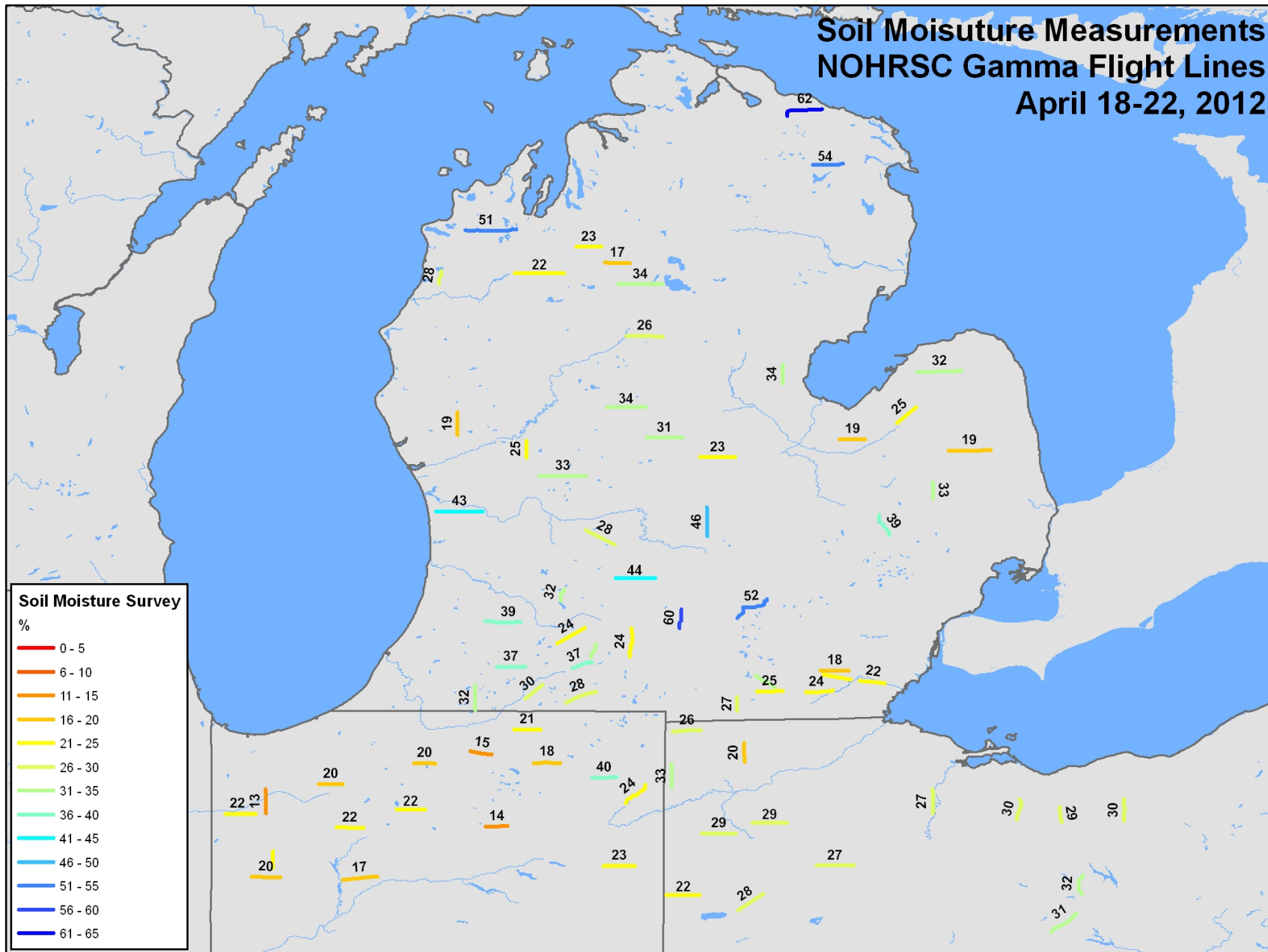


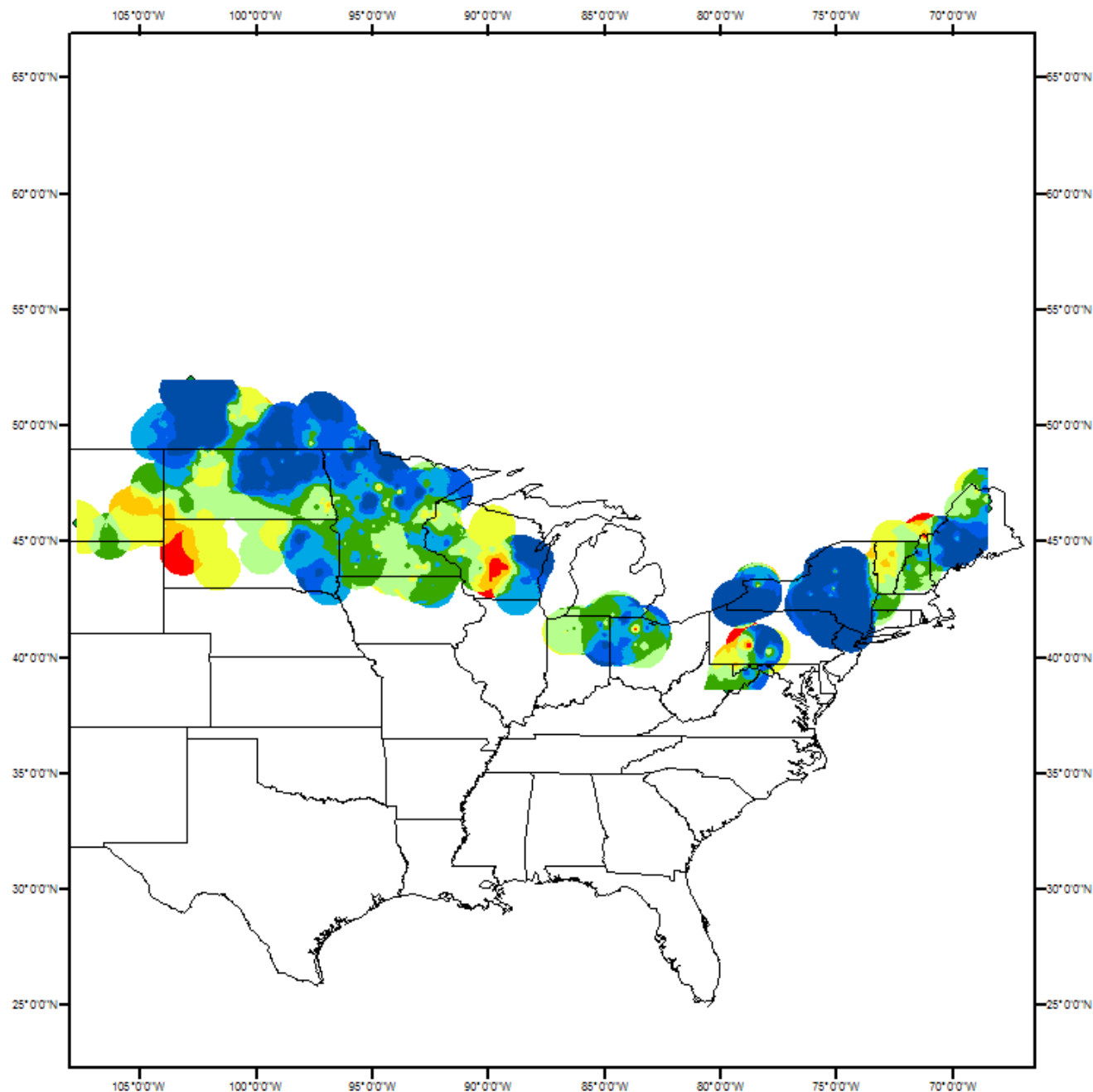
Added or moved 70 lines 2011
Added or moved 105 lines in 2012

Soil Moisture Measurements NOHRSC Gamma Flight Lines April 1-5, 2012



Soil Moisture Measurements NOHRSC Gamma Flight Lines April 18-22, 2012





Soil Moisture (upper 20 cm)

November 2012



National Operational Hydrologic
Remote Sensing Center


National Snow Analysis

Multi-sensor Snow Observations

Ground

Airborne

Satellite



National Weather Service
National Operational Hydrologic Remote Sensing Center

Home News Organization

Home

Snow Information
National Analyses
Interactive Maps
3D Visualization
Airborne Surveys
Satellite Obs
Forecasts
Data Archive
SHEF Products

Observations near
City, ST


Science/Technology
NOHRSC
GIS Data Sets
Special Purpose Imagery


About The NOHRSC Staff

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Snow Climatology
Related Links

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Colorado Snow Survey #1

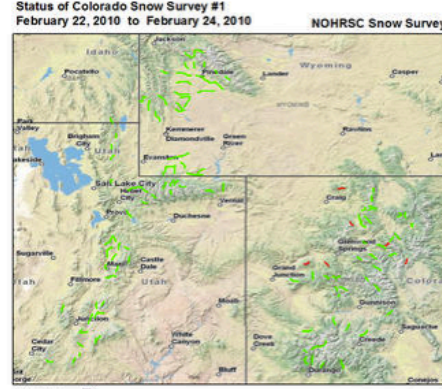
Started February 22, 2010
Ended February 25, 2010

The Colorado Snow Survey started on February 22 and ended on February 25, 2010. Gamma snow water equivalent measurements were collected in Colorado, Utah, Wyoming, and Idaho.

Aerial Survey Photos

Flightline Status

Status of Colorado Snow Survey #1
February 22, 2010 to February 24, 2010



NOHRSC Snow Survey

Flight Line Status
115 Completed
6 Not Completed
95 % Complete

Date	States	Status Map	Flight Line SHEF Product	SNODAS SWE Image	Interpolated Gamma SWE Image	Used in Assimilation
2010-02-24	CO	2010-02-24	2010-02-24	2010-02-24	N/A	No
2010-02-23	UT	2010-02-23	2010-02-23	2010-02-23	N/A	No
2010-02-22	ID,UT,WY	2010-02-22	2010-02-22	2010-02-22	N/A	No

NSA Snow Water Equivalent

March 18, 2012

NOHRSC Snow Survey

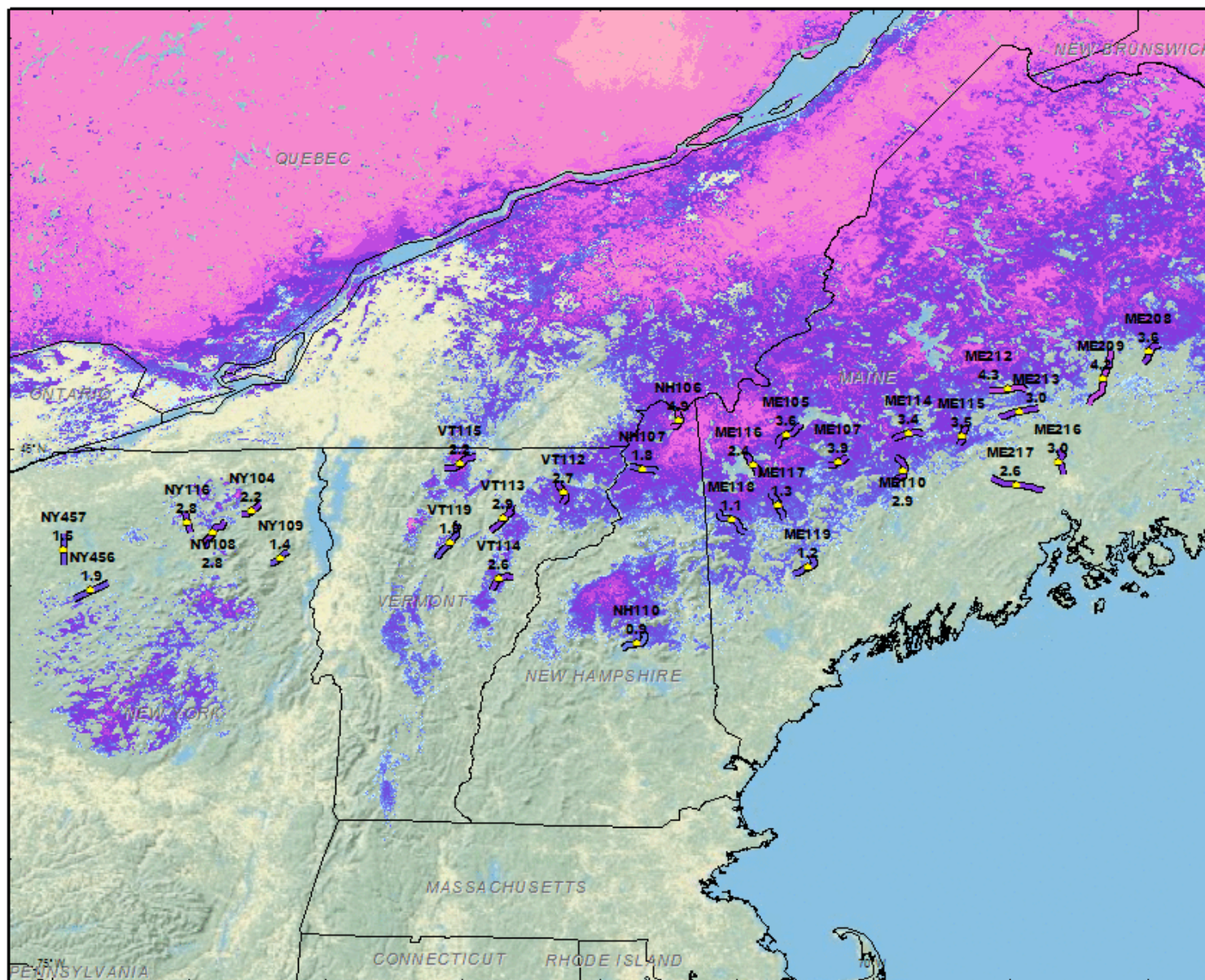


National Operational Hydrologic
Remote Sensing Center

SNODAS SWE (in)

0 - 0.0039
0.0039 - 0.039
0.039 - 0.1968
0.1968 - 0.393
0.393 - 0.984
0.984 - 1.96
1.96 - 3.93
3.93 - 5.9
5.9 - 9.84
9.84 - 19.68
19.68 - 29.52
29.52 - 39.37
39.37 - 78.74

Office of Hydrology
National Weather Service, NOAA
Chanhassen, MN



0 20 40 80 120 160 Miles

National Snow Analysis

Multi-sensor Snow Observations

Ground

Airborne

Satellite

2001 2003 2004 2005 2006
2007 2008 2009 2010 2011
2012

FY 2010 Aerial Photos:

Survey 007, dates: 0222-0225, region: Colorado Snow Survey #1













Select

"KMZ" file containing photo locations

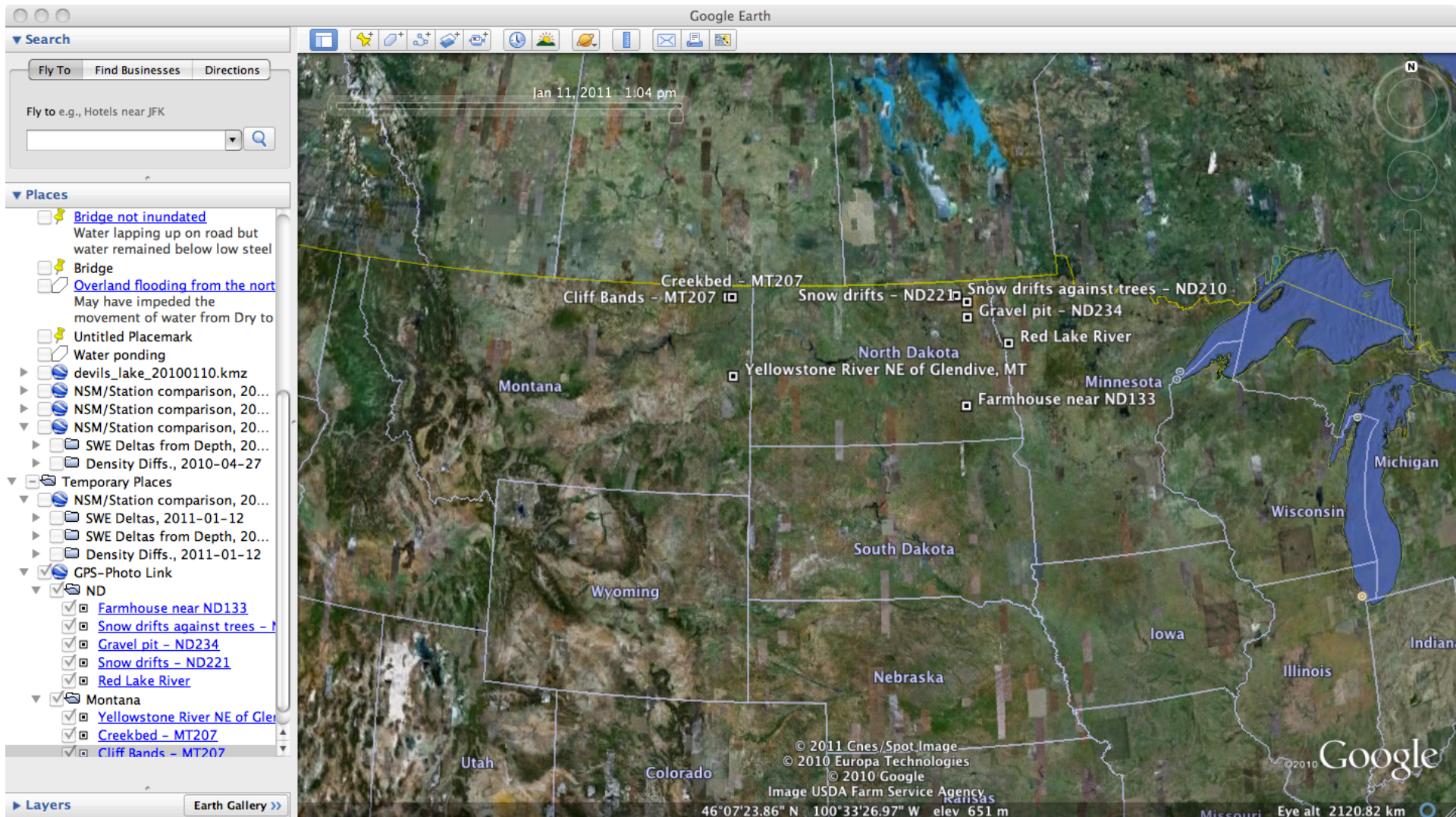
2010 Snow Survey Photos

Sort by Flightline Sort by Date Sort by Caption

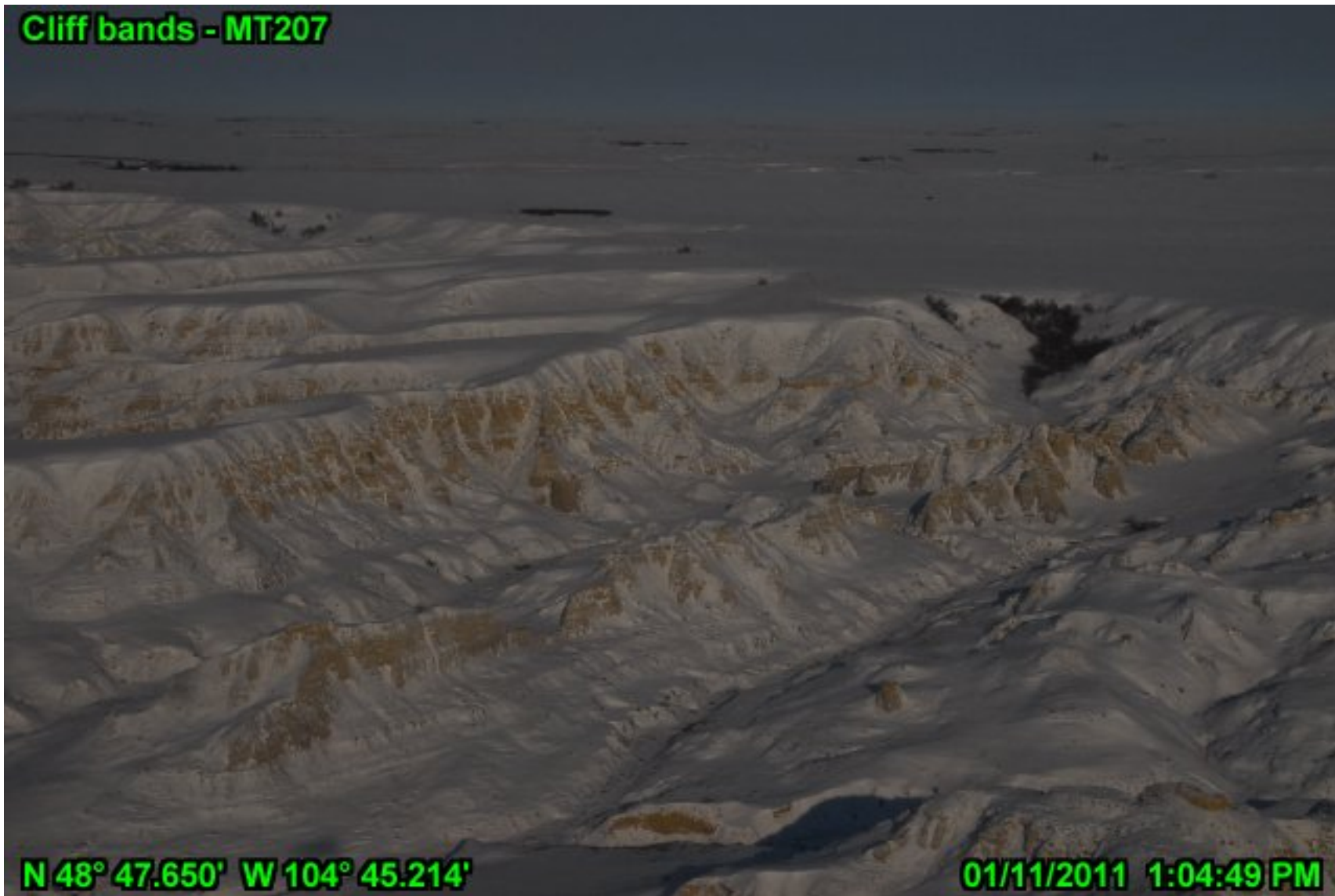
Survey 007: Colorado Snow Survey #1

 Date: 2010-02-22 Bridger Natl Forest	 Date: 2010-02-22 S of Alton, WY	 Date: 2010-02-23 N of Alton, UT
 Date: 2010-02-23 Bryce Canyon UT	 Date: 2010-02-23 Bryce Canyon UT	 Date: 2010-02-23 Bryce Canyon UT
 Date: 2010-02-23 Bryce Canyon Airport	 Date: 2010-02-23 Bryce Canyon Airport	 Date: 2010-02-23 Bryce Canyon Natl Park
		

National Snow Analysis



Cliff bands - MT207



N 48° 47.650' W 104° 45.214'

01/11/2011 1:04:49 PM

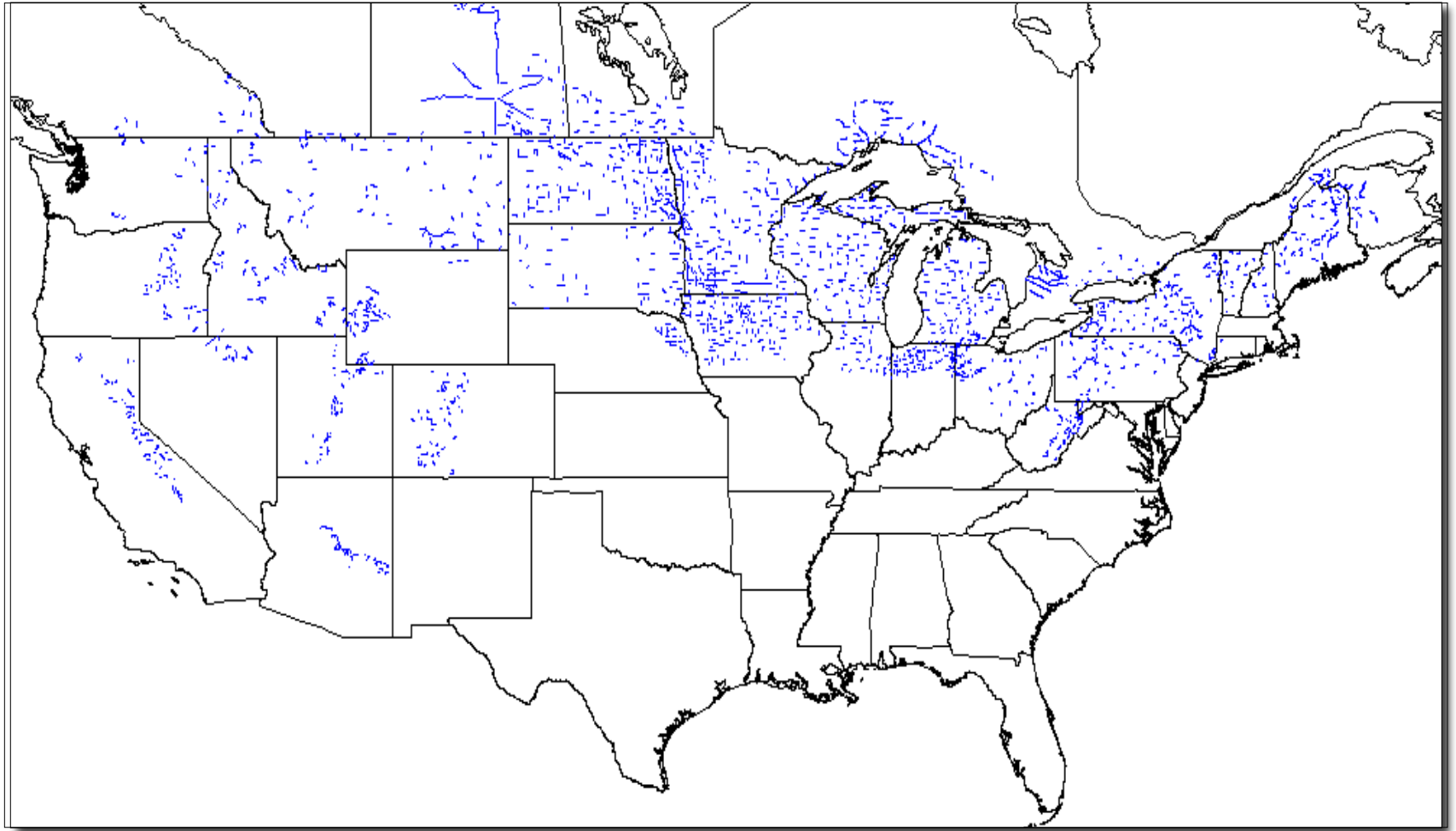
Flood Recon

Quick Facts:

- Flooding causes \$4.5 billion worth of damage annually in the U.S.
- Responsible for 75% of all Presidential disaster declarations.
- Claims more than 130 lives annually.

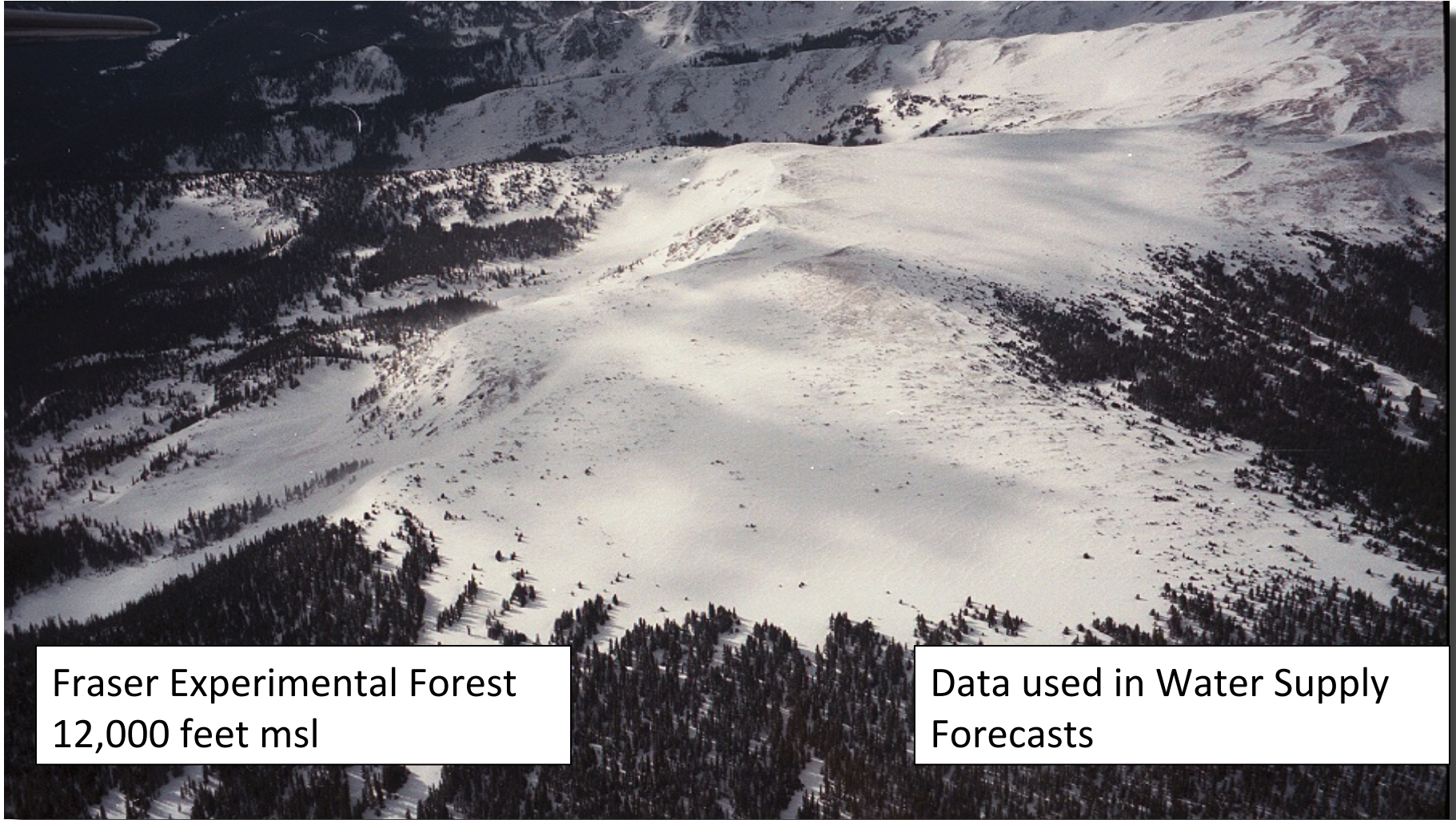


Airborne Flight Line Network



Airborne Flight Line Network

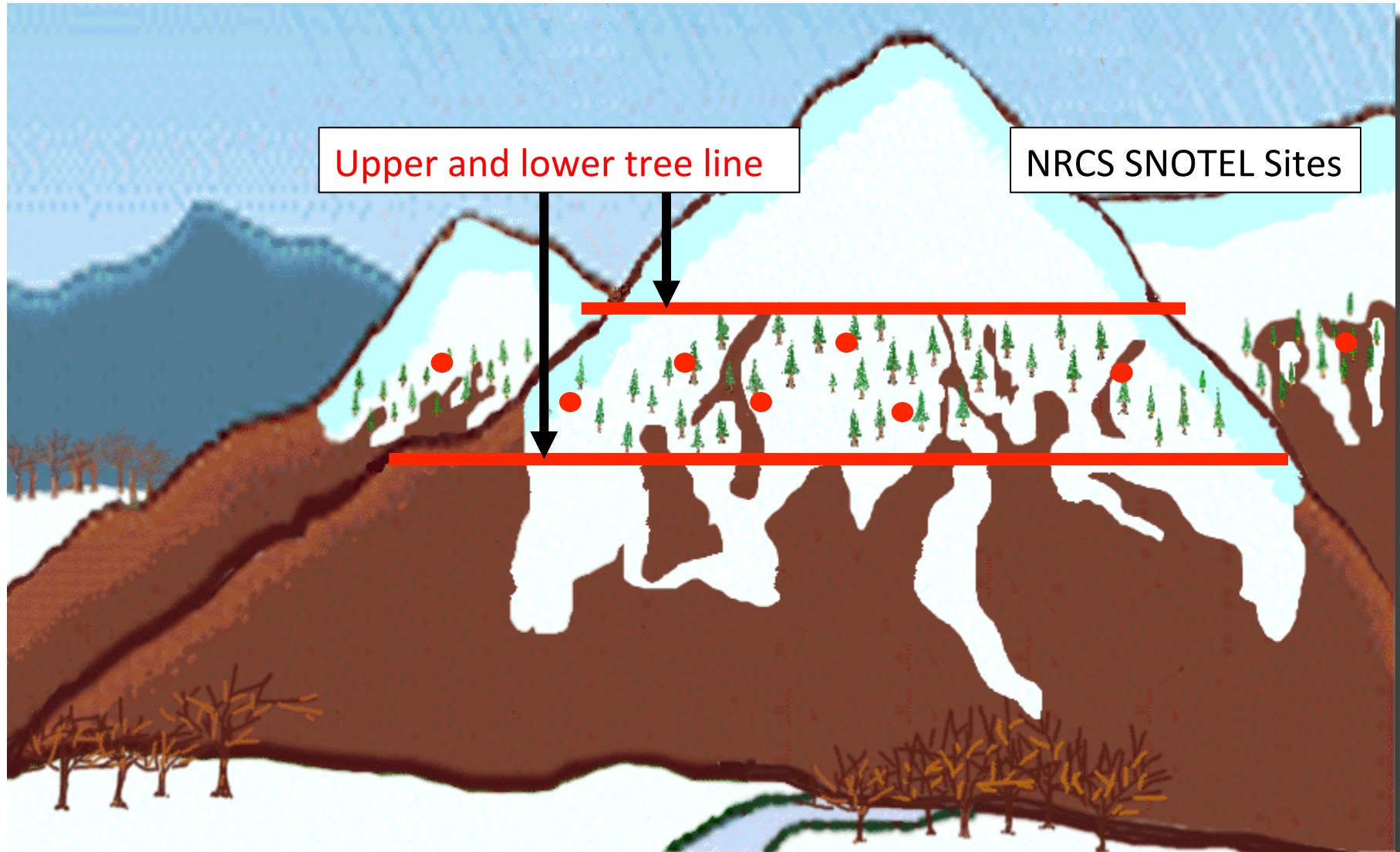
Colorado flight line EX122



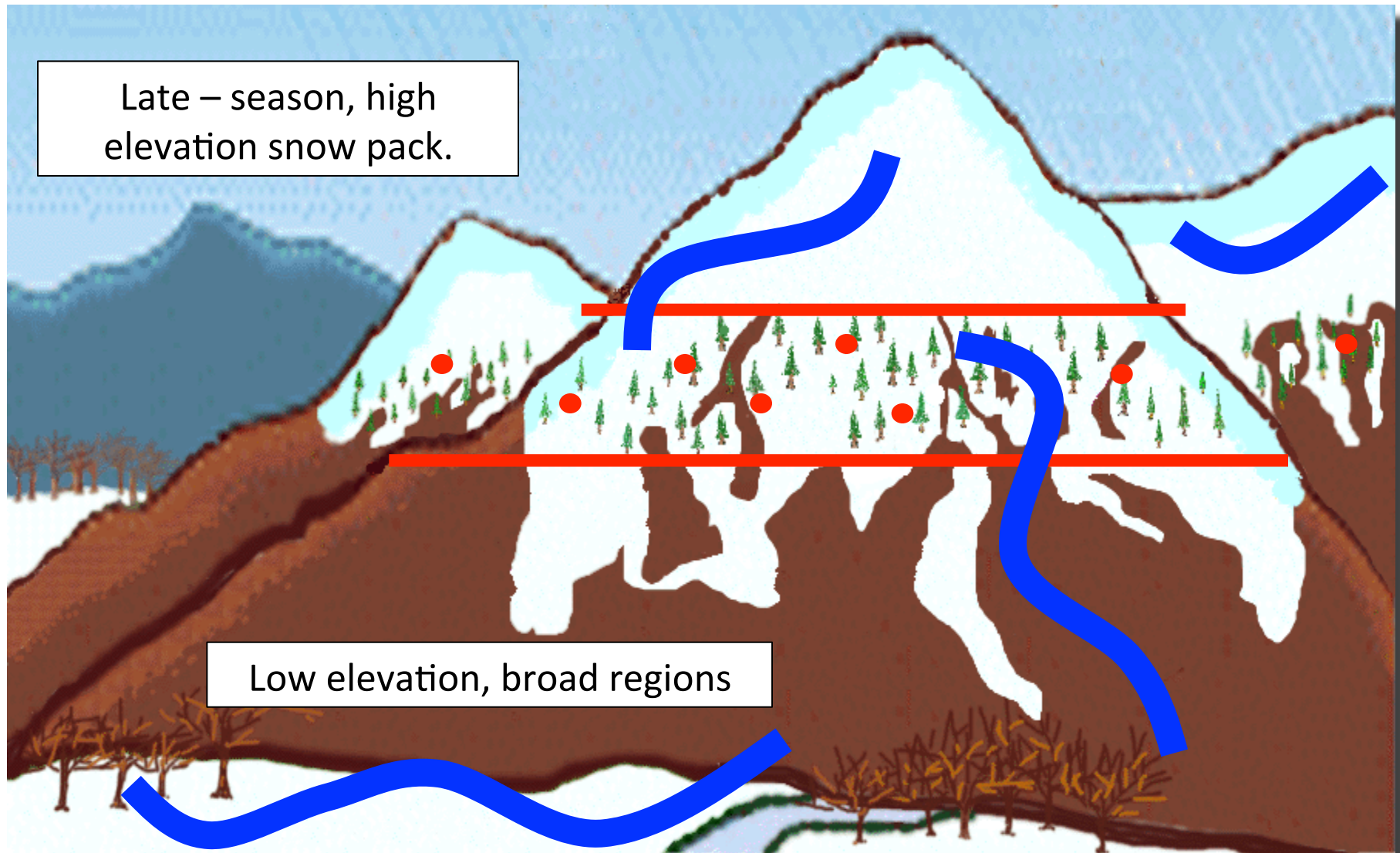
Fraser Experimental Forest
12,000 feet msl

Data used in Water Supply
Forecasts

Airborne Flight Line Network



Airborne Flight Line Network



National Snow Analysis

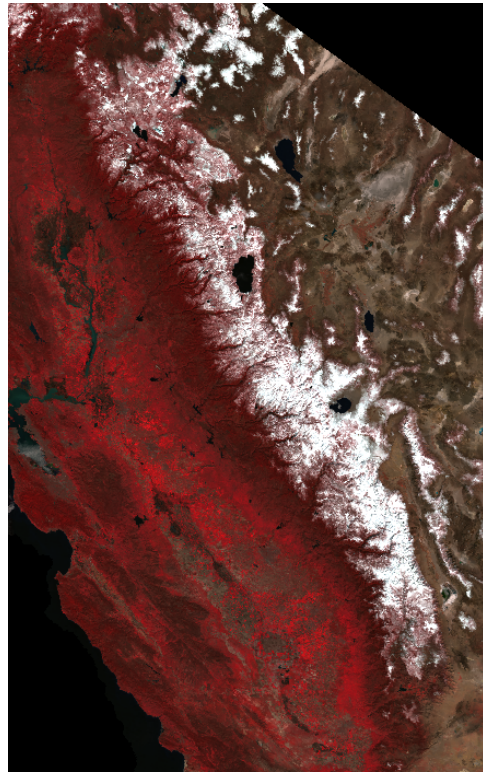
MODSCAG Algorithm, images courtesy of T. Painter, U. Utah

Multi-sensor Snow Observations

Ground

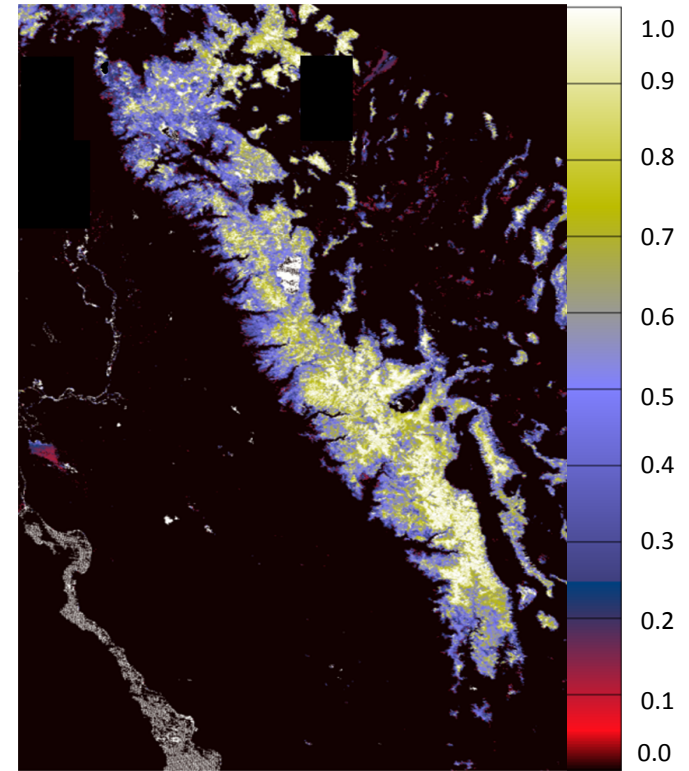
Airborne

Satellite

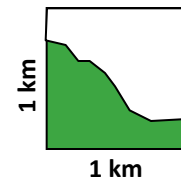


EOS Terra
MODIS

Sierra Nevada, Mar 7 2004



Fractional Snow Cover



$SCA_{frac} = 0.5$

Observations alone are not enough !



National Snow Analysis

Multi-sensor Snow Observations

Ground

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Snow Modeling and Data Assimilation

Numerical Weather
Prediction Model
Forcings

Gridded Snow
Characteristics

U.S.

1-km²

Hourly

Snow Information Products

Data Products

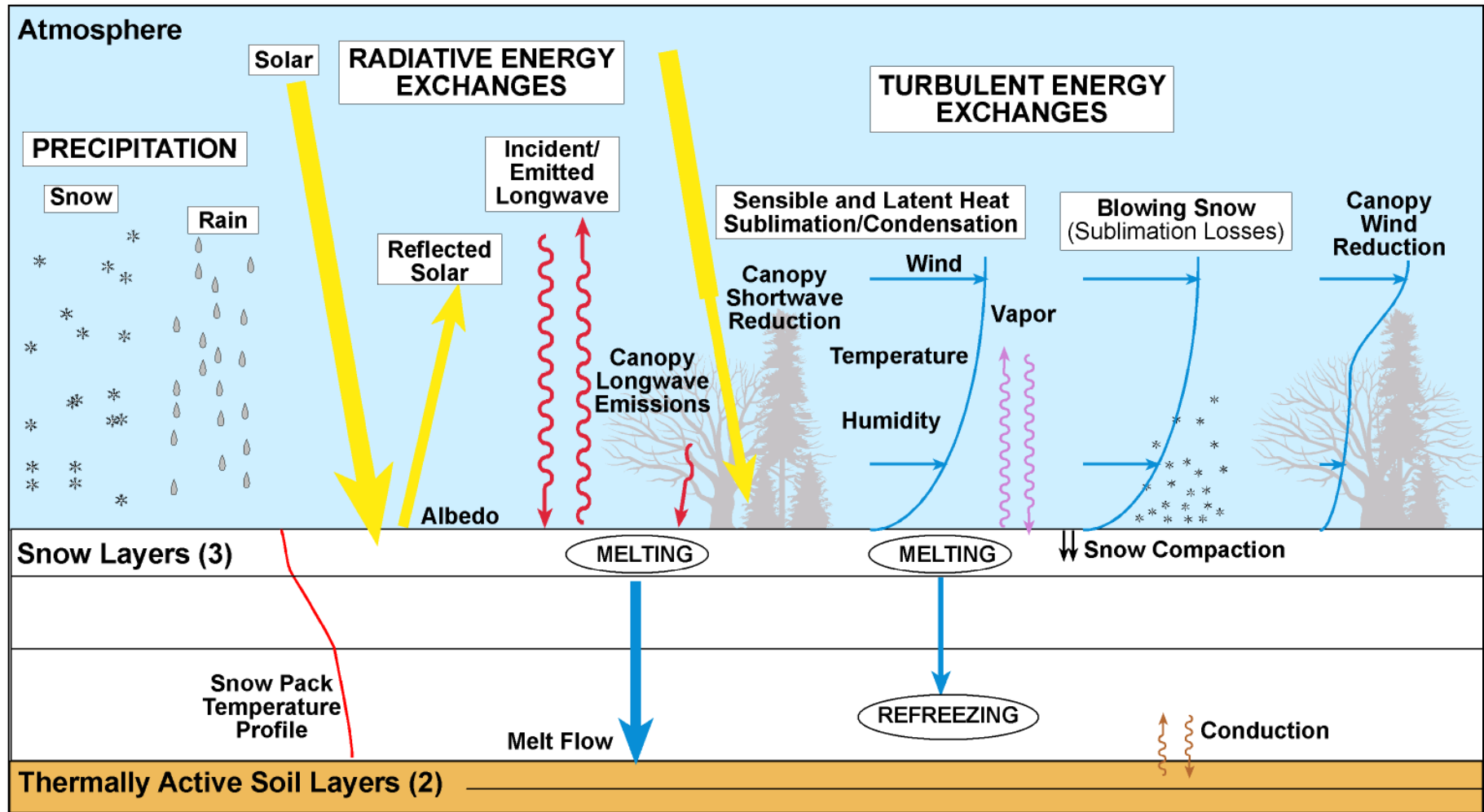
Interactive Maps

Time Series Plots

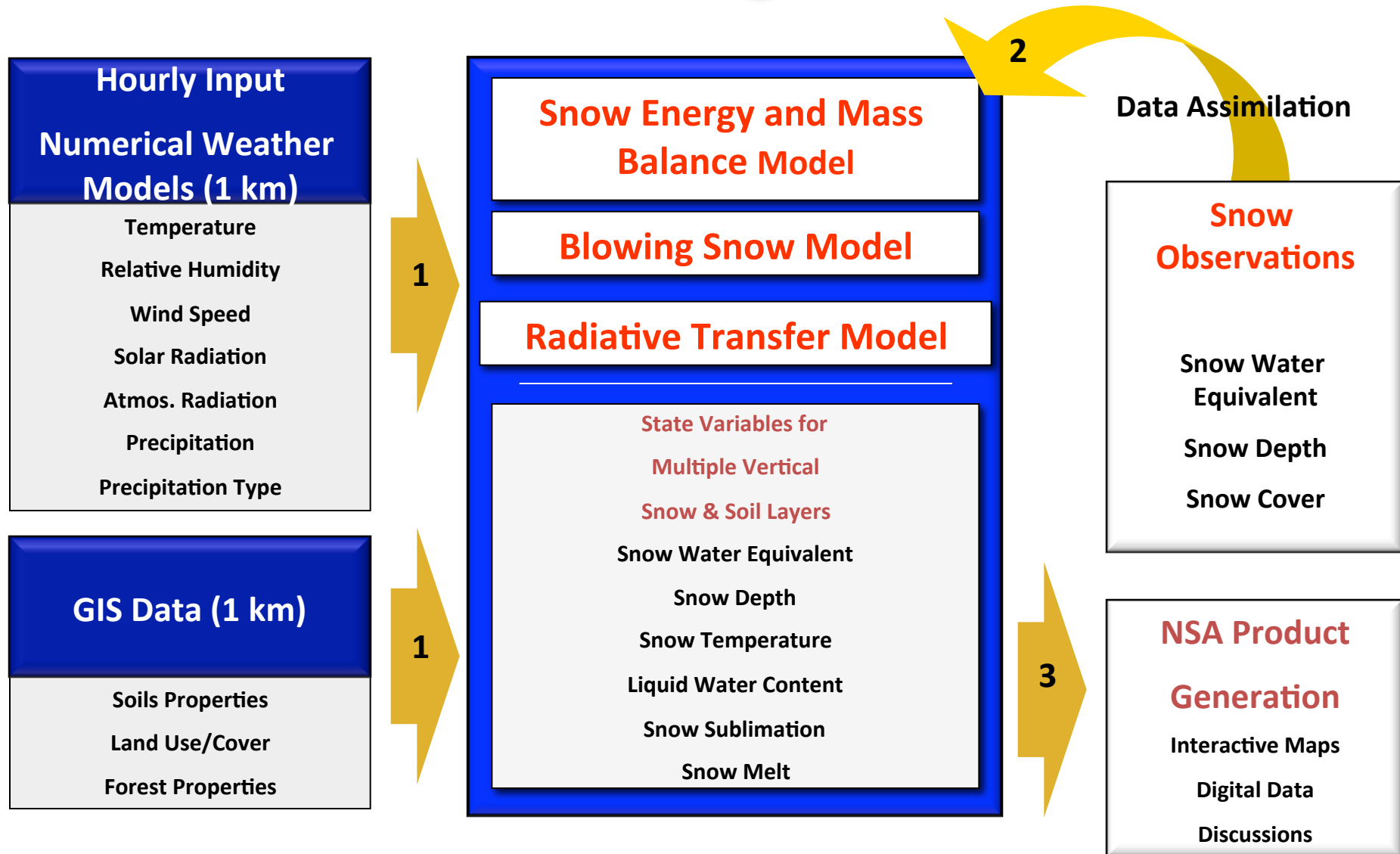
Text Discussions

NOHRSC Snow Model Physics

$$(K\downarrow - K\uparrow) + (L\downarrow - L\uparrow) + Q_e + Q_h + Q_g + Q_p = \Delta Q$$



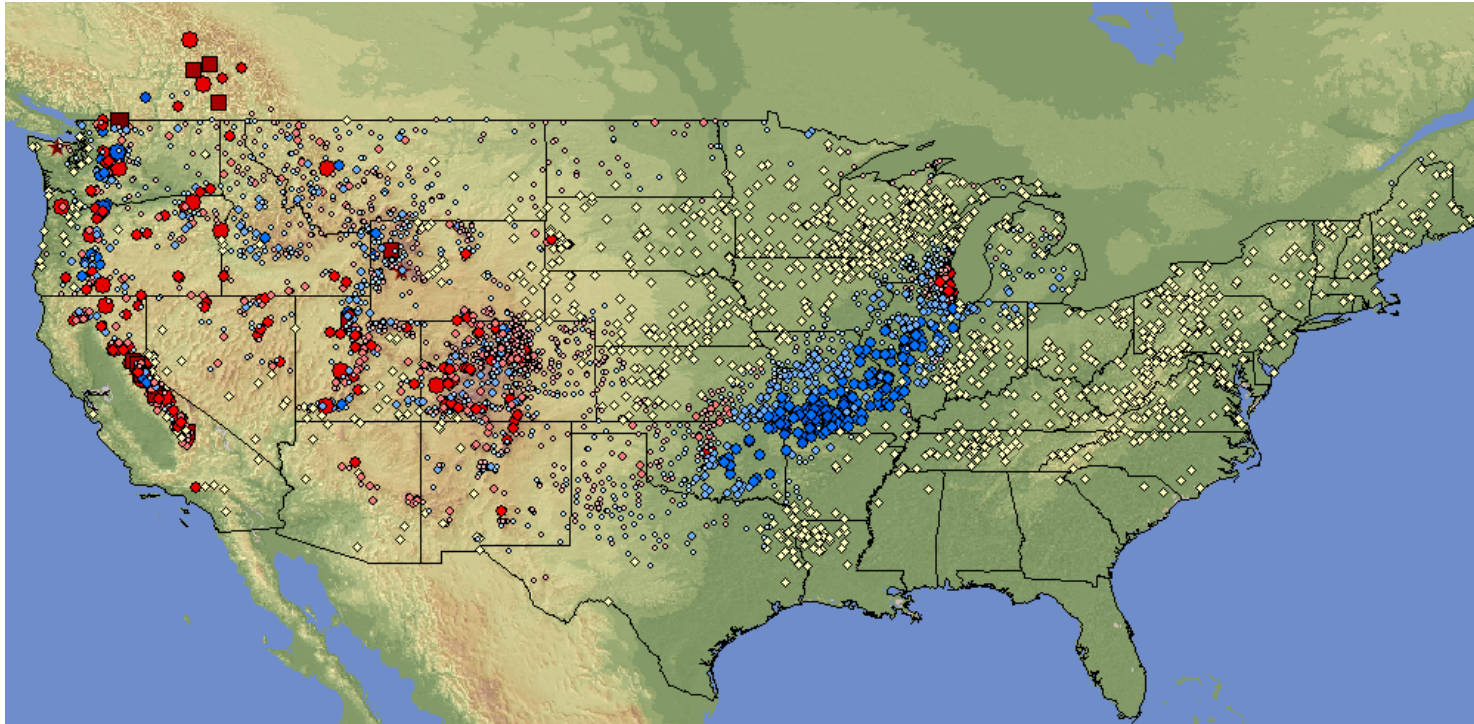
Snow Modeling Framework



Snow Observational Assimilation

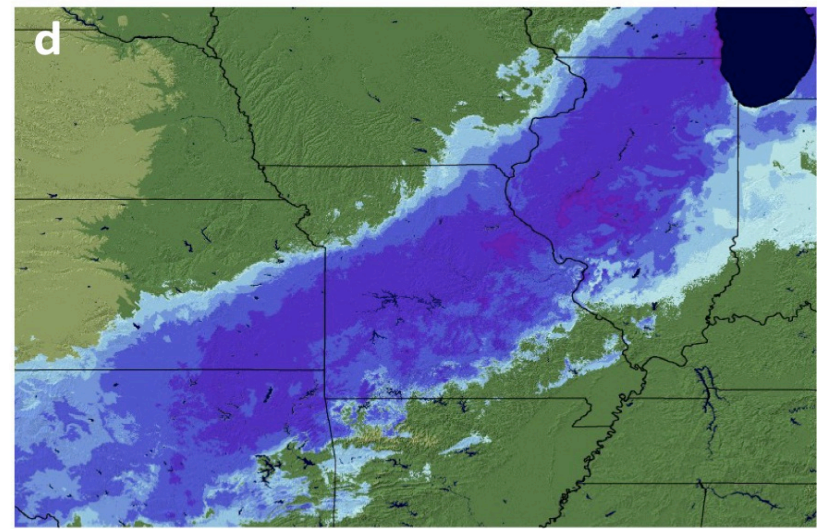
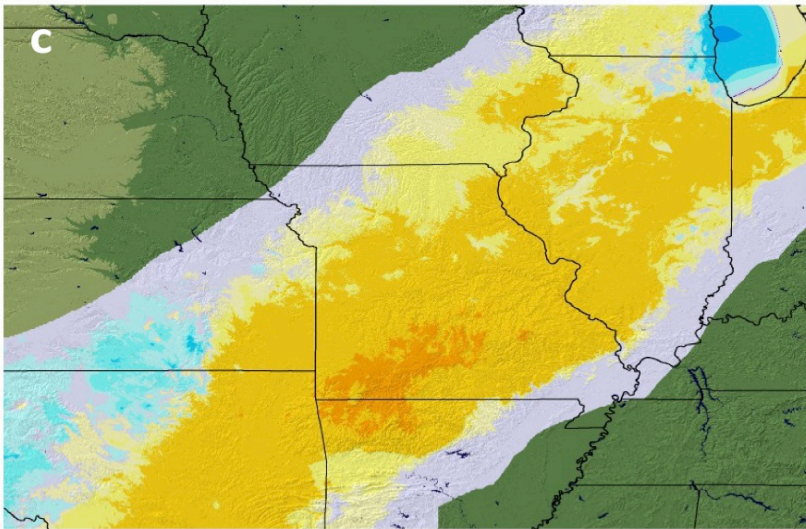
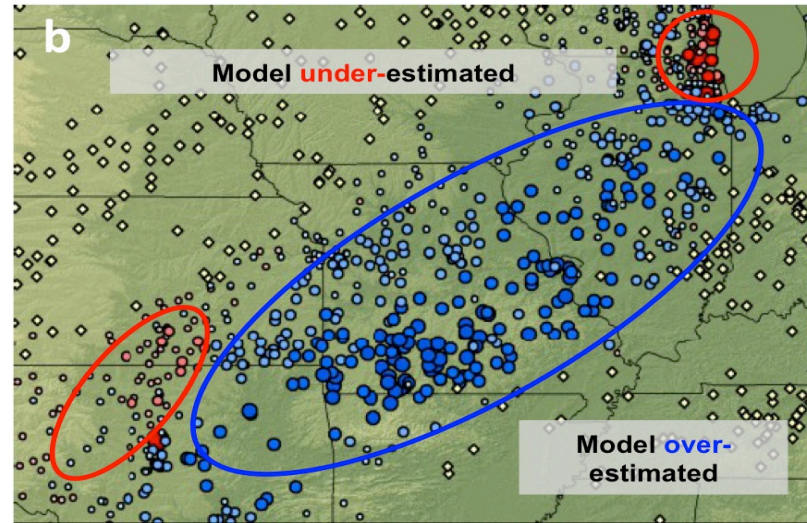
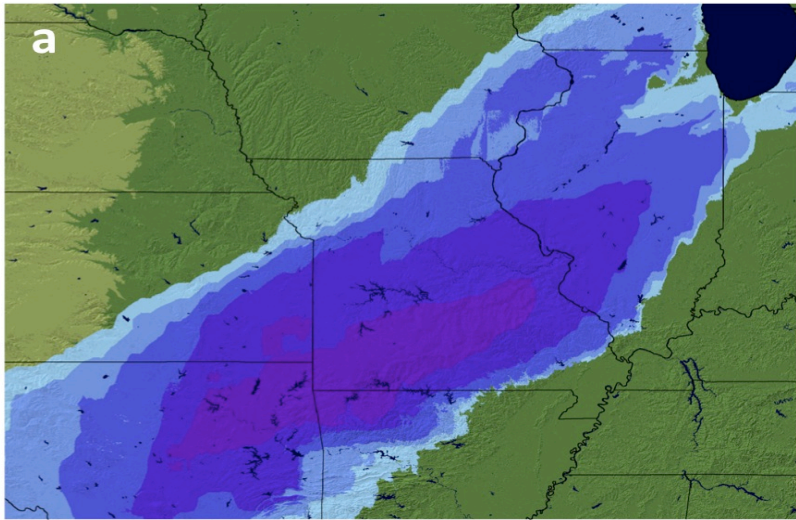
Daily SWE and Snow Depth Observations are used to update the model

If pattern of differences is explainable, an update field is generated and used to nudge the model toward observed states



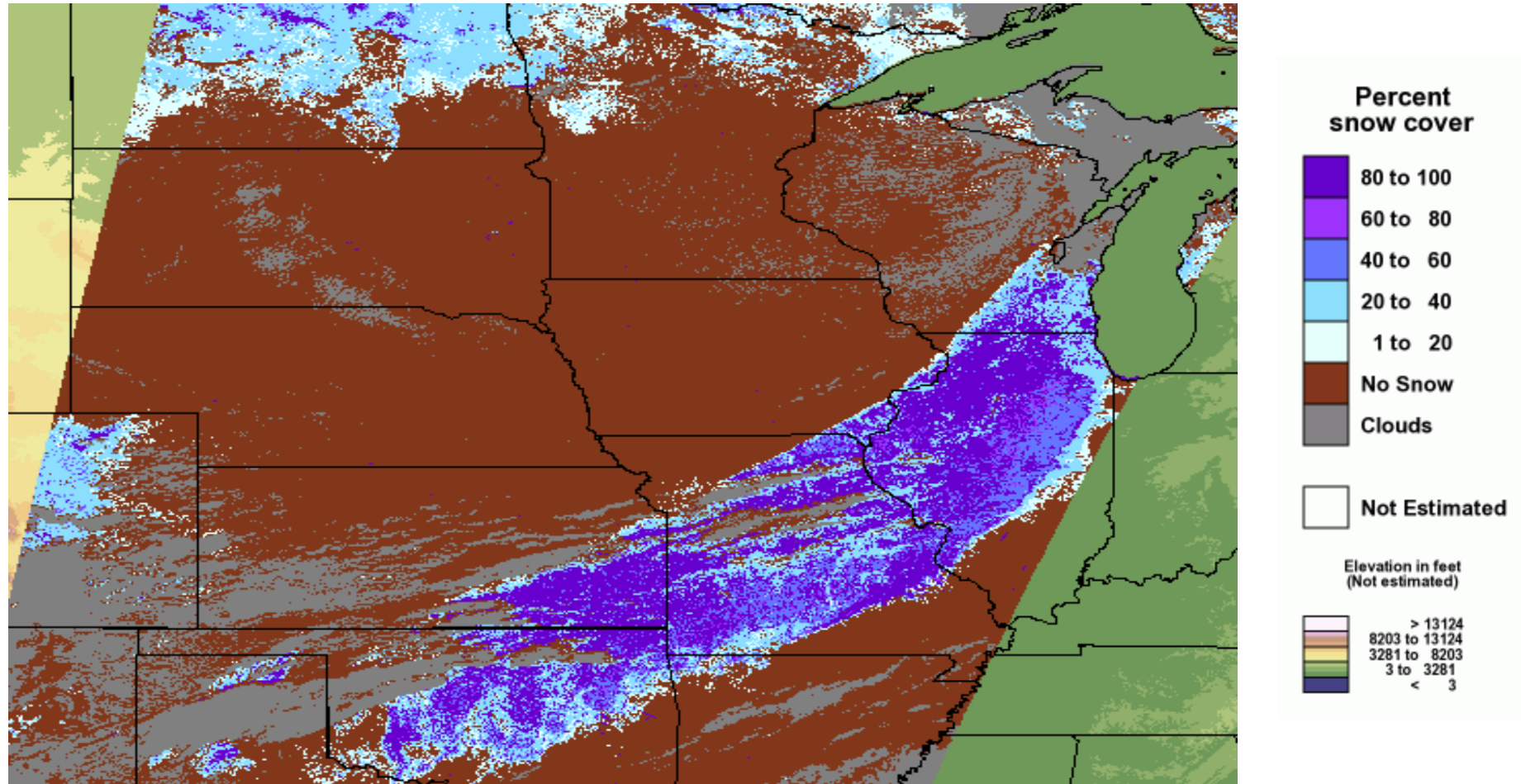
- Uncertainties in driving data
 - RUC2 precipitation under/over estimation
 - Typing issue; rain/ snow
 - Placement of storm track
- Uncertainties due to model physics
 - Melt problems due to temperature bias
 - Sublimation rates

Assimilation Example



Assimilation Example

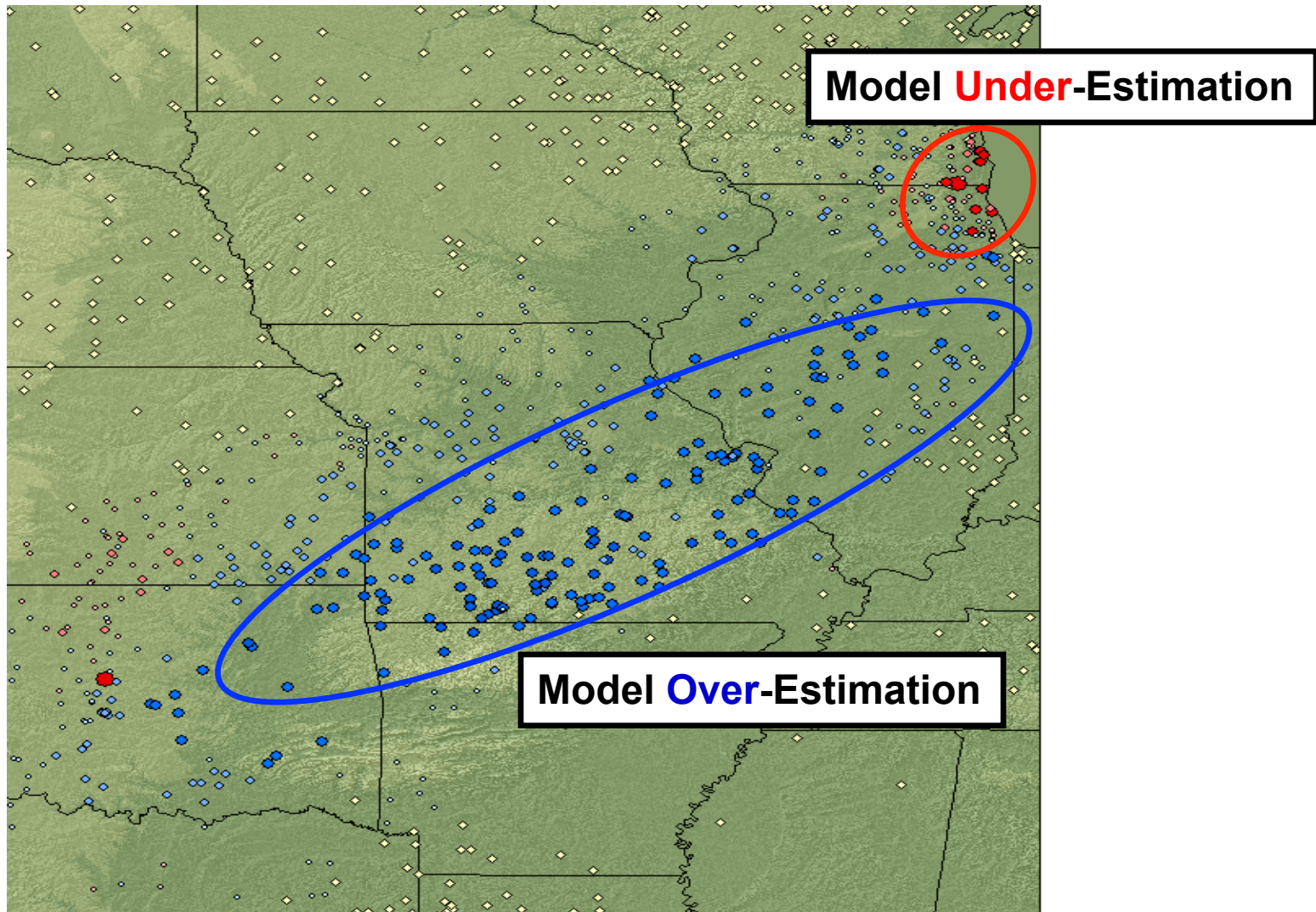
Satellite Snow Cover



Fractional Satellite Snow Map
December 2, 2007

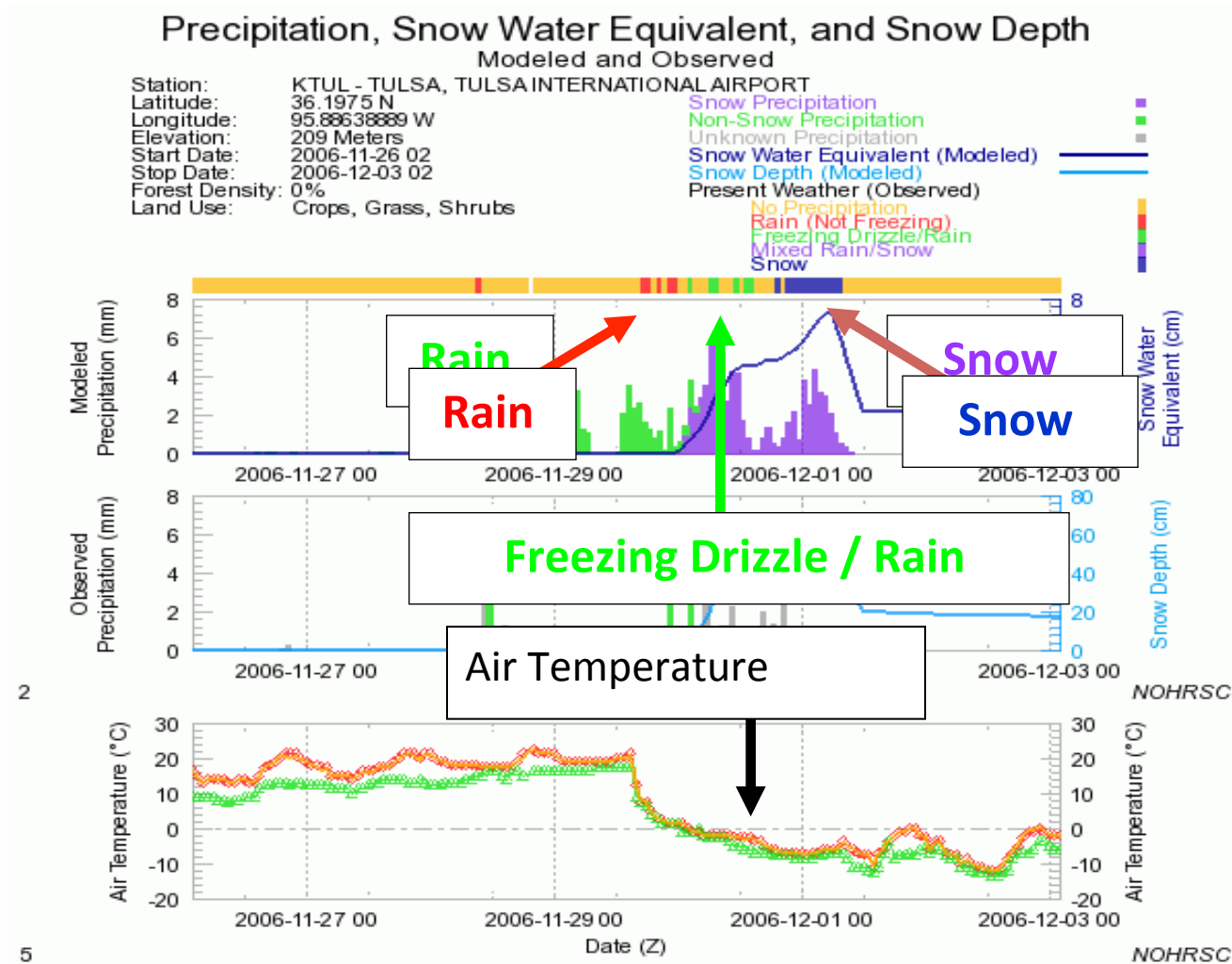
RUC2 Precipitation Typing

- The RUC2 categorized freezing rain as snow.



RUC2 Precipitation Typing

- The RUC2 categorized precipitation freezing rain as snow.



Observed – Modeled SWE 2012-12-17 06Z – 2012-12-18 06Z

Model **Under**-Estimation

Model **Over**-Estimation

Observed - Modeled SWE

ssm1054_md_based_2012121706_2012121806
D_SWE_OM

- ★ -10.0000 - -10.0
- ★ -9.99999 - -5.0
- ★ -4.99999 - -1.0

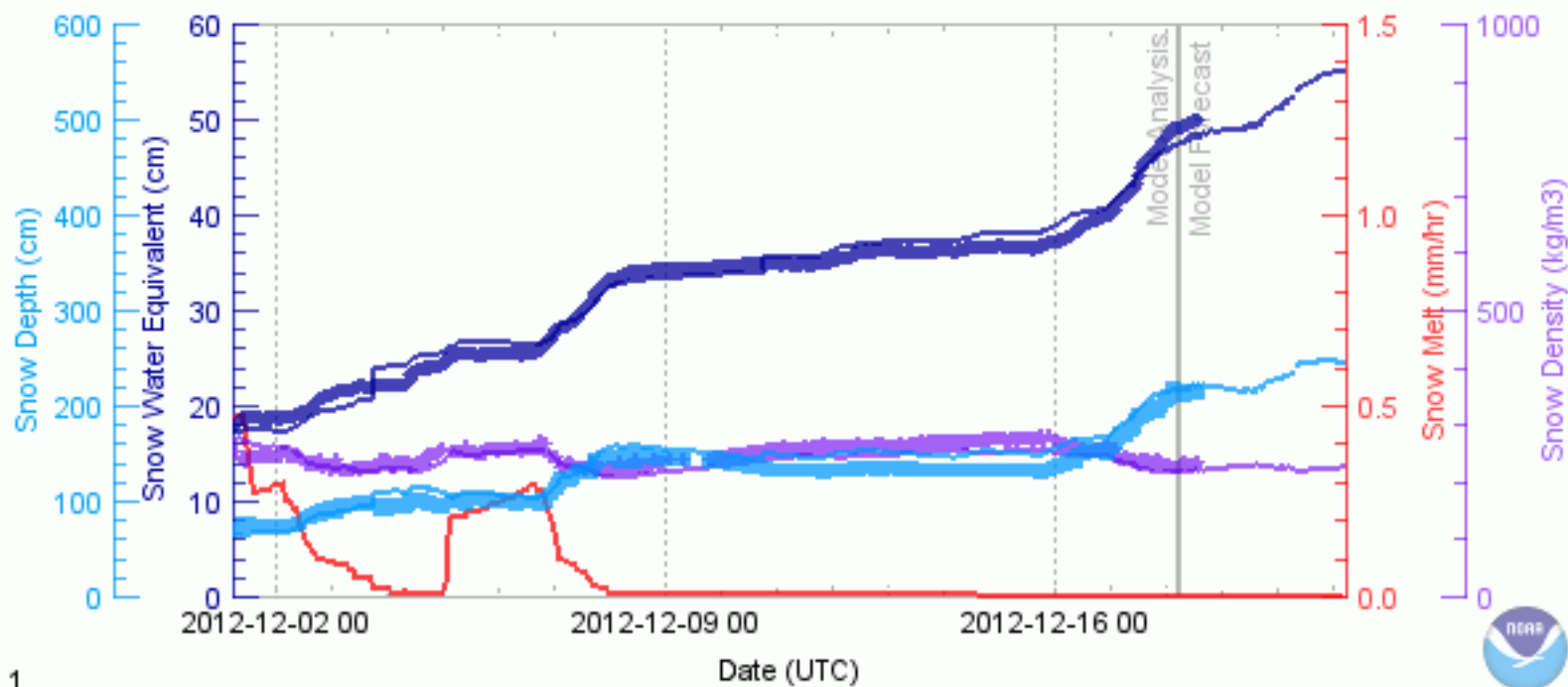
- | | | |
|-----------------------|-------------------------|-------------------|
| ■ -0.99999 - -0.5 | ● -0.0099999 - -0.00001 | ● 0.100001 - 0.25 |
| ■ -0.49999 - -0.25 | ● -0.000009 - -0.00001 | ■ 0.250001 - 0.5 |
| ● -0.249999 - -0.1 | ● 0.000011 - 0.01 | ■ 0.500001 - 1.0 |
| ● -0.0999999 - -0.075 | ● 0.010001 - 0.025 | ★ 1.000001 - 5.0 |
| ● -0.0749999 - -0.05 | ● 0.025001 - 0.05 | ★ 5.000001 - 10.0 |
| ● -0.49999 - -0.025 | ● 0.050001 - 0.075 | |
| ● -0.24999 - -0.01 | ● 0.075001 - 0.1 | |

Snow Water Equivalent, Snow Depth, and Snow Melt

Modeled and Observed

Station: PGPW1 - PIGTAIL PEAK
 Latitude: 46.6215 N
 Longitude: 121.3863 W
 Elevation: 1772 Meters
 Start Date: 2012-12-01 06 UTC
 Stop Date: 2012-12-21 06 UTC
 Forest Density: 100%
 Land Use: Cool Conifer Forest

	(Modeled)	(Observed)
Snow Water Equivalent		
Snow Depth		
Snow Density		
Snow Melt		
Assimilation		

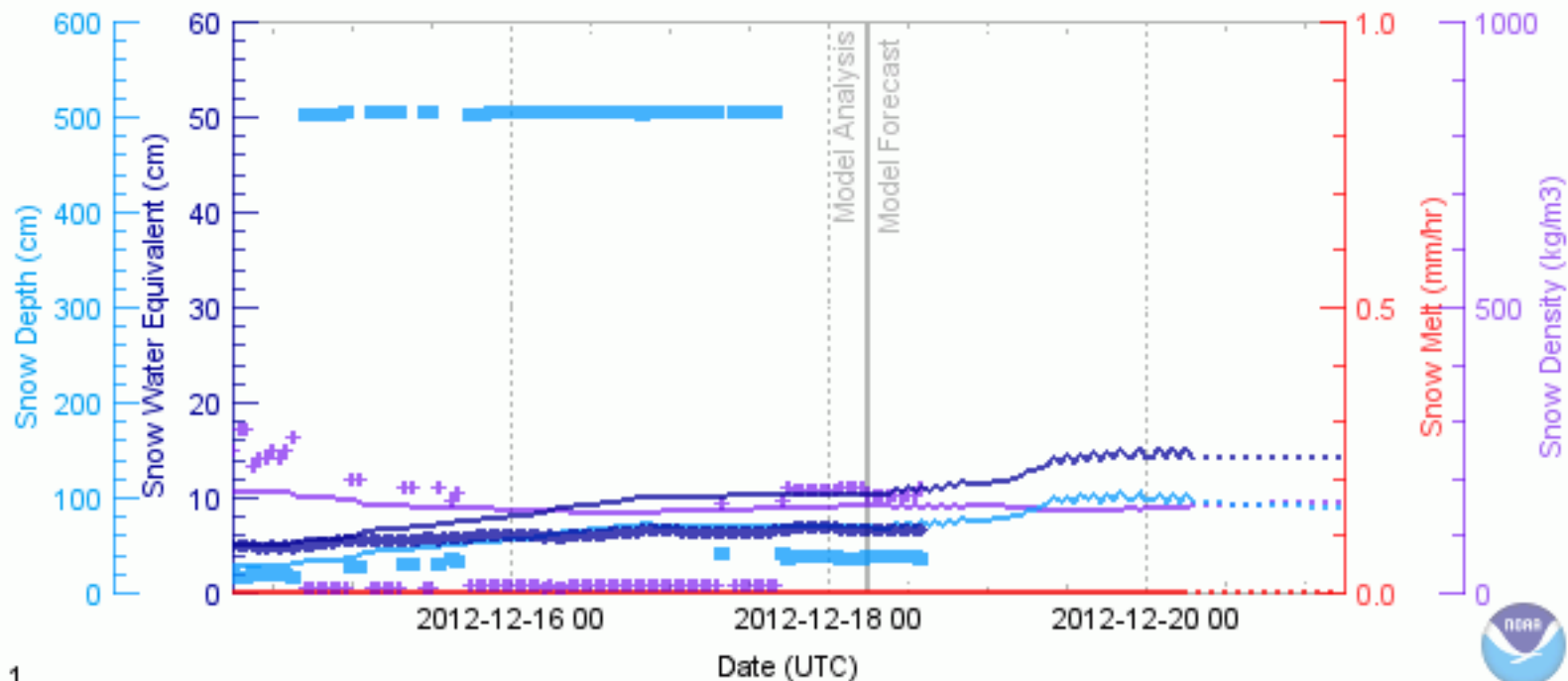


Snow Water Equivalent, Snow Depth, and Snow Melt

Modeled and Observed

Station: OVRC2 - OVERLAND RES.
 Latitude: 39.0906 N
 Longitude: 107.6347 W
 Elevation: 3031 Meters
 Start Date: 2012-12-14 06 UTC
 Stop Date: 2012-12-21 06 UTC
 Forest Density: 89%
 Land Use: Cool Conifer Forest

	(Modeled)	(Observed)
Snow Water Equivalent	— (Dark Blue)	— (Dark Blue)
Snow Depth	— (Light Blue)	— (Light Blue)
Snow Density	— (Purple)	— (Purple)
Snow Melt	— (Red)	— (Red)
Assimilation	— (Green)	— (Green)



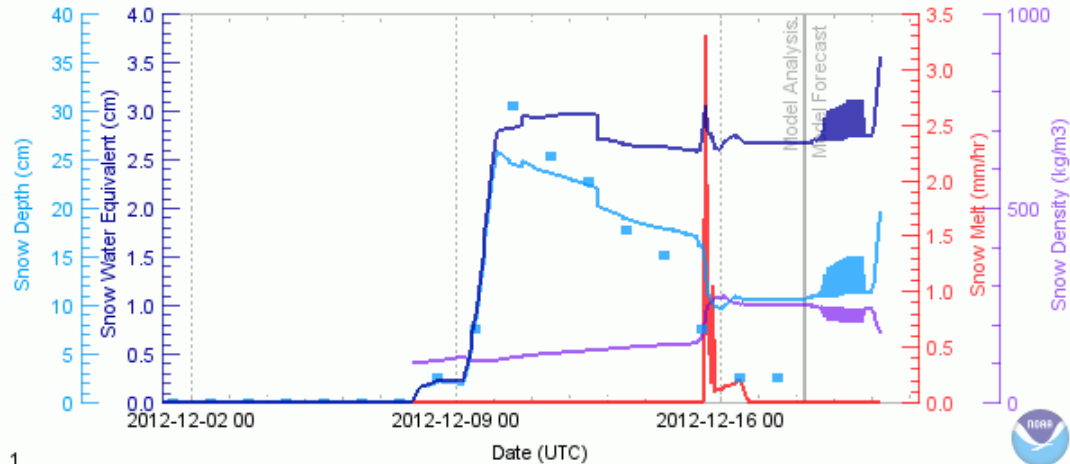
Snow Water Equivalent, Snow Depth, and Snow Melt

Modeled and Observed

Station: CHNM5 - CHANHASSEN 2SW
 Latitude: 44.8447 N
 Longitude: 93.5547 W
 Elevation: 293 Meters
 Start Date: 2012-12-01 06 UTC
 Stop Date: 2012-12-21 06 UTC
 Forest Density: 36%
 Land Use: Cool Forest and Field

Snow Water Equivalent
 Snow Depth
 Snow Density
 Snow Melt
 Assimilation

(Modeled) (Observed)
 — ◆
 — +
 —
 —
 —

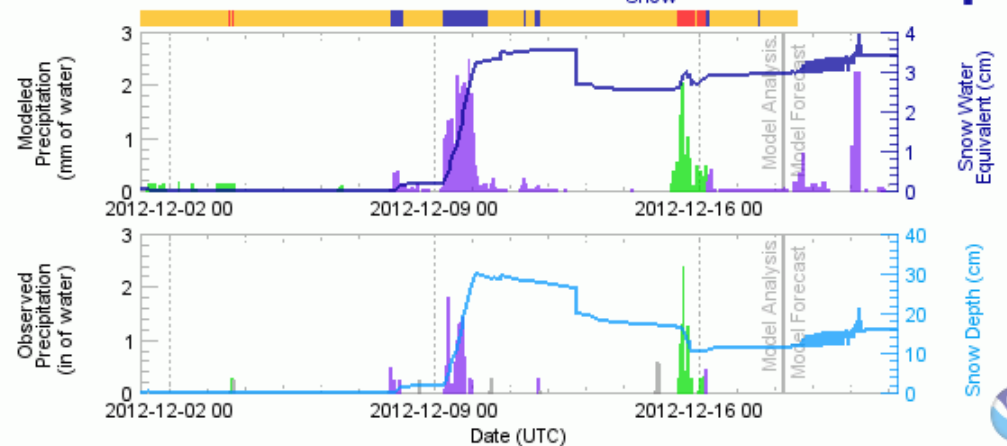


ation, Snow Water Equivalent, and Snow Depth

Modeled and Observed

Station: KMSP - MINNEAPOLIS-ST PAUL INTERNATIONAL
 Latitude: 44.866667 N
 Longitude: 93.216667 W
 Elevation: 248 Meters
 Start Date: 2012-12-01 06 UTC
 Stop Date: 2012-12-21 06 UTC
 Forest Density: 9%
 Land Use: Conifer Boreal Forest

Snow Precipitation
 Non-Snow Precipitation
 Unknown Precipitation
 Snow Water Equivalent (Modeled)
 Snow Depth (Modeled)
 Present Weather (Observed)
 No Precipitation
 Rain (Not Freezing)
 Freezing Drizzle/Rain
 Mixed Rain/Snow
 Snow



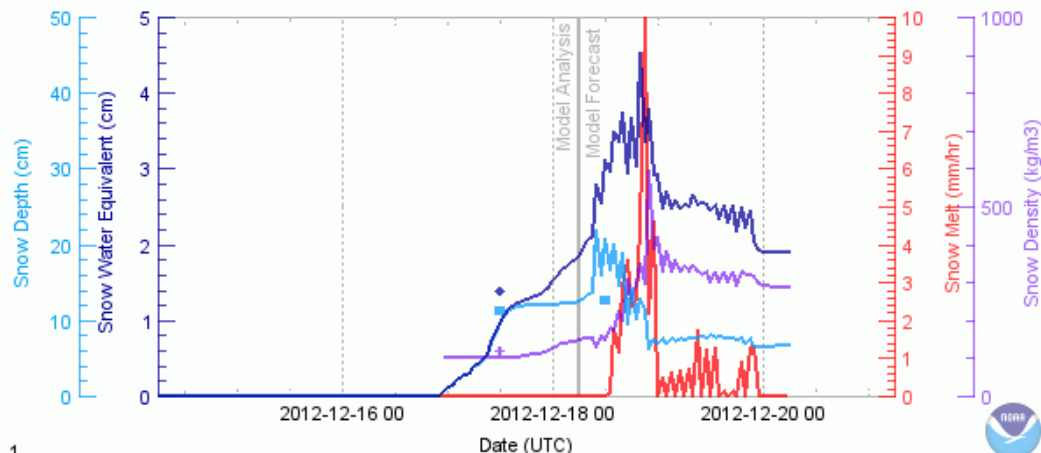
Snow Water Equivalent, Snow Depth, and Snow Melt

Modeled and Observed

Station: 8853S_MADIS - TAMM WORTH 0.4 NNW, NH
 Latitude: 43.86449 N
 Longitude: 71.2661 W
 Elevation: 164 Meters
 Start Date: 2012-12-14 06 UTC
 Stop Date: 2012-12-21 06 UTC
 Forest Density: 85%
 Land Use: Urban

(Modeled) (Observed)
 Snow Water Equivalent
 Snow Depth
 Snow Density
 Snow Melt
 Assimilation

(Modeled) (Observed)
 Snow Water Equivalent
 Snow Depth
 Snow Density
 Snow Melt
 Assimilation

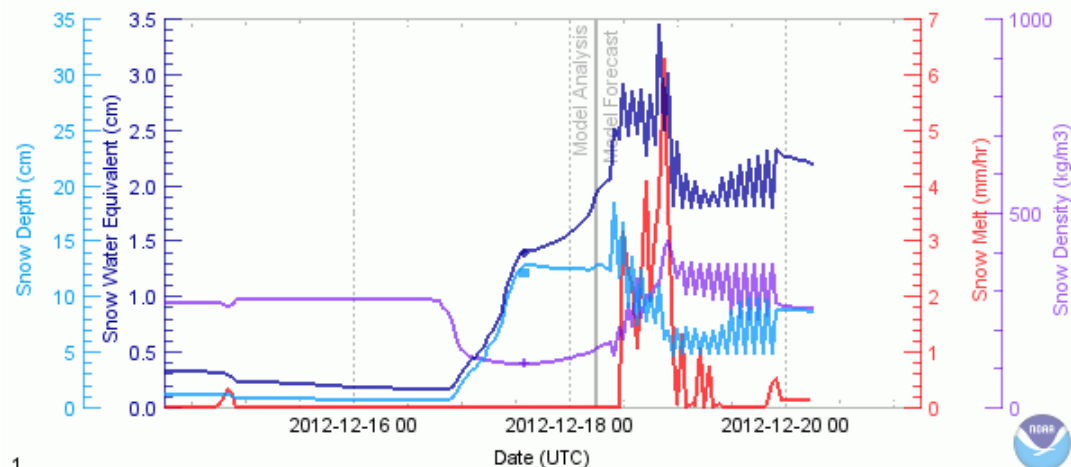


Snow Water Equivalent, Snow Depth, and Snow Melt

Modeled and Observed

Station: 6038S_MADIS - NEW HAMPTON 4.1 N, NH
 Latitude: 43.66397 N
 Longitude: 71.6427 W
 Elevation: 219 Meters
 Start Date: 2012-12-14 06 UTC
 Stop Date: 2012-12-21 06 UTC
 Forest Density: 41%
 Land Use: Corn and Beans Cropland

(Modeled) (Observed)
 Snow Water Equivalent
 Snow Depth
 Snow Density
 Snow Melt
 Assimilation



National Snow Analysis

Multi-sensor Snow Observations

Ground

Airborne

Satellite

Snow Modeling and Data Assimilation

Numerical Weather
Prediction Model
Forcings

Gridded Snow
Characteristics

U.S.
1-km²
Hourly

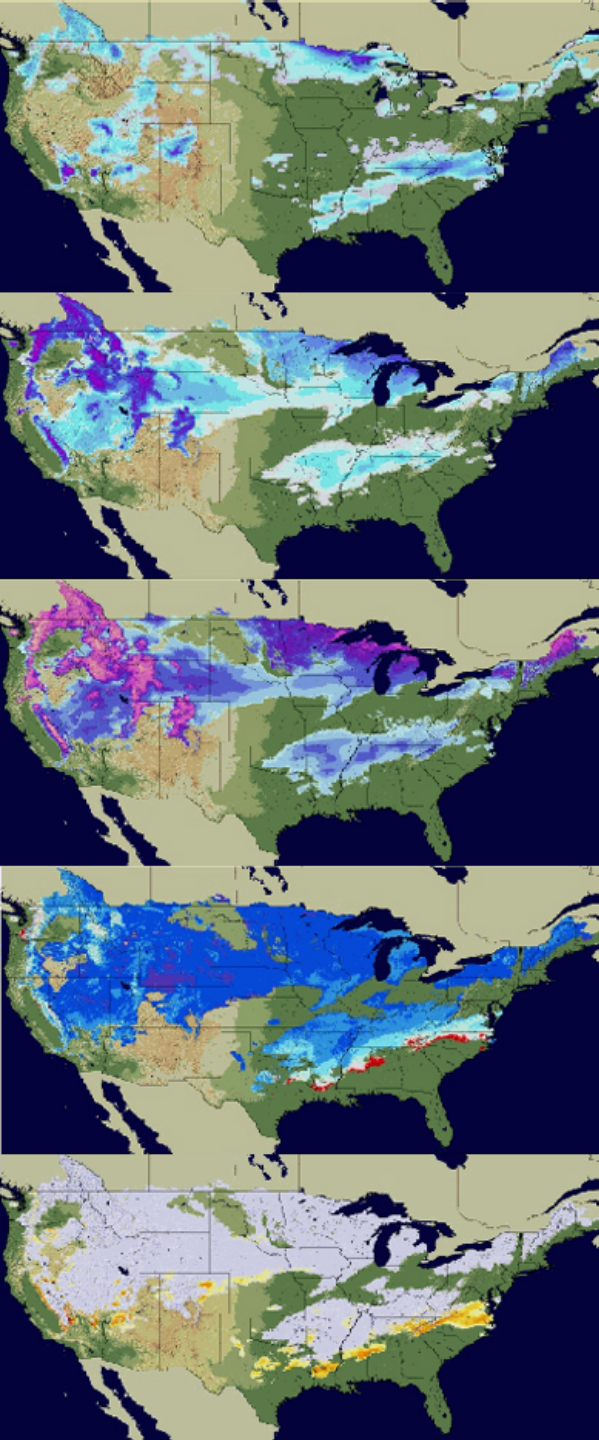
Snow Information Products

Data Products

Interactive Maps

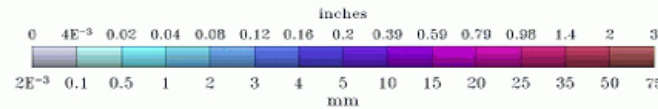
Time Series Plots

Text Discussions



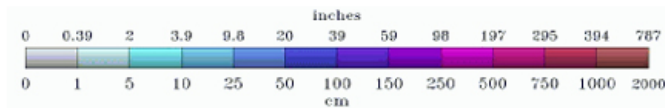
Snowfall

24-Hour Total Ending 2006-02-21 06 UTC



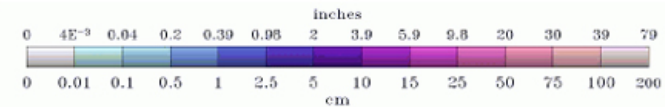
Snow Depth

2006-02-21 06 UTC



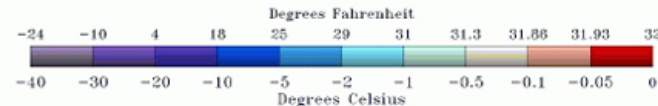
Snow Water Equivalent

2006-02-21 06 UTC



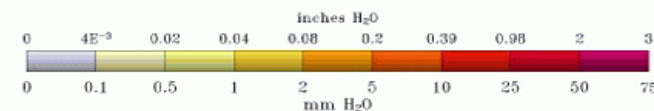
Snowpack Temperature

24-Hour Average Ending 2006-02-21 06 UTC



Snow Melt

24-Hour Total Ending 2006-02-21 05 UTC



PRODUCTS

- Hourly and Daily
- 1 km² Resolution

INTERNET

- Interactive Maps
- 3D Visualization
 - e.g. Google Earth
- Time-series loops
- National/Regional Discussions
- Text summaries by watershed
- Point Queries

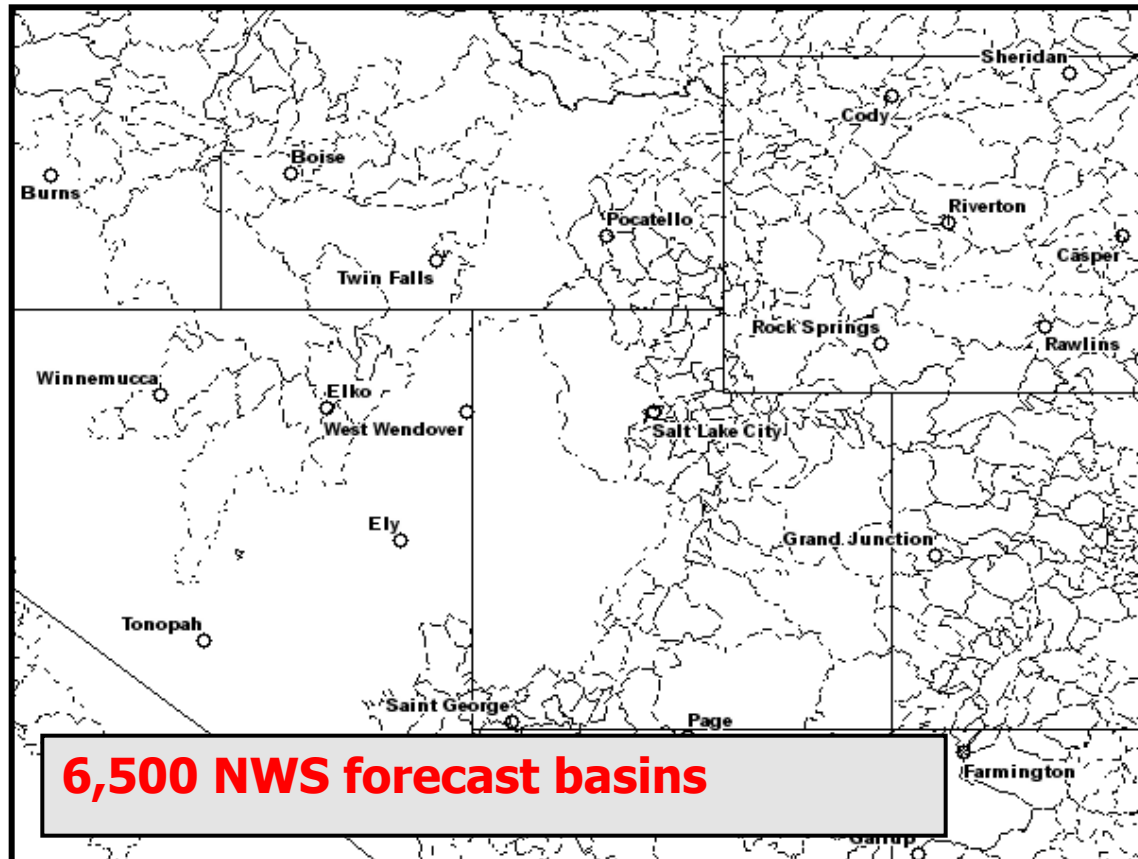
DIRECT FEED

- Push or Pull
- Gridded Data
- Flat Binary or GIS-ready

National Snow Analysis

Integrated Modeled / Observed Snowpack State Variables

Daily Basin-by-Basin NSA Products Shipped to Web





Interactive Snow Information

River Forecast Center Basins

[Submit](#)

Listing of regions

State / Province Basins

[Submit](#)

Listing of regions

HUC Basins

[Submit](#)

Listing of regions

County Warning Area Basins

[Submit](#)

Listing of regions

NOHRSC Snow Model Text Product Quick Query Page

This page is a quick interface to query snow model data from all basins within a specified region. There currently are five types of regions available: River Forecast Center areas, U.S. states (and Canadian provinces), Hydrologic Unit Code areas, County Warning Areas, and individual counties. There are two ways, shown below, to get to the basin information.

- Click on the "Listing of regions" link to display all the regions of that type. Then, click on the name of the region of interest on the new page.
- Or, if the name of the region is already known, type it in the text field next to the appropriate region type (i.e. Massachusetts under "State / Province"), and click "Submit." To help differentiate the counties, include the 2-letter state abbreviation with the county name.

Listing of River Forecast Center (and other basin grouping) regions

(14 regions)

[ABRFC](#) [LMRFC](#) [NBRFC](#) [NWRFC](#) [SERFC](#)

[CBRFC](#) [MARFC](#) [NCRFC](#) [NYCDEP](#) [WGRFC](#)

[CNRFC](#) [MBRFC](#) [NERFC](#) [OHRFC](#)

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National Weather Service
National Operational Hydrologic Remote Sensing Center
1735 Lake Drive W.
Chanhassen, MN 55317



2010 February 9 2:00 Z - + Snow Water Equivalent

Text Metric Units Refresh screen ☐ Show only non-zero values

BASIN-BY-BASIN SNOW SUMMARY FOR MBRFC

SNOW WATER EQUIVALENT ANALYSIS (MODEL + OBSERVATIONS)

February 9, 2010 02 Z

NATIONAL OPERATIONAL HYDROLOGIC REMOTE SENSING CENTER
Office of Climate, Water, and Weather Services
NATIONAL WEATHER SERVICE, NOAA
CHANHASSEN, MN 55317

URL: www.nohrsc.noaa.gov Phone: 952-361-6610 Fax: 952-361-6634

LEGEND VARIABLE	HEADER	UNITS
Basin Identifier	(Basin)	n/a
Sub-basin Number	(Sub)	1,2,3...6 if applicable, or TTL for total basin
Date of Model Analysis	(Date)	YYMMDD.HH (UTC)
Min Elevation	(Min E)	Meters - Only applicable to NWS-subdivided basins
Max Elevation	(Max E)	Meters - Only applicable to NWS-subdivided basins
Basin Description	(Description)	n/a
Snow Water Equivalent		
Basin/Sub-basin Mean	(Mean)	Meters
Basin/Sub-basin Std. Dev	(StDev)	Meters
Basin/Sub-basin Minimum	(Min)	Meters
Basin/Sub-basin Maximum	(Max)	Meters
Basin/Sub-basin Volume	(Volume)	Cubic meters
Basin/Sub-basin Volume	(Volume(2))	Billion liters

Basin	Sub	Date	Min E	Max E	Description	Mean	StDev	Min	Max	Volume
101	TTL	100209.02	582	686	REPUBLICAN R. NR BLOOMINGTON, NE	0.0187	0.0006	0.0169	0.0196	542900
102	TTL	100209.02	548	725	THOMPSON CREEK AT RIVERTON, NE	0.0206	0.0058	0.0146	0.0550	1791000
103	TTL	100209.02	543	659	REPUBLICAN RIVER AT RIVERTON, NE	0.0206	0.0012	0.0177	0.0233	864000
104	TTL	100209.02	508	642	REPUBLICAN RIVER AT GUIDE ROCK NE	0.0307	0.0103	0.0197	0.0737	3084000
105	TTL	100209.02	466	602	REPUBLICAN RIVER NR HARDY NE	0.0274	0.0041	0.0182	0.0510	2201000
106	TTL	100209.02	483	567	LOVEWELL RES. KS	0.0283	0.0010	0.0256	0.0313	774200
107	TTL	100209.02	444	545	REPUBLICAN RIVER NR SCANDIA KS	0.0260	0.0011	0.0237	0.0290	1377000
108	TTL	100209.02	424	565	BUFFALO CR NR JAMESTON KS	0.0280	0.0015	0.0253	0.0320	2417000
109	TTL	100209.02	407	503	REPUBLICAN RIVER AT CONCORDIA KS	0.0286	0.0020	0.0253	0.0342	2079000
110	TTL	100209.02	381	507	REPUBLICAN RIVER NR CLIFTON KS	0.0305	0.0016	0.0278	0.0357	4225000
111	TTL	100209.02	362	496	REPUBLICAN RIVER AT CLAY CENTER KS	0.0302	0.0015	0.0264	0.0358	2991000
112	TTL	100209.02	337	442	MILFORD LAKE NR JUNCTION CITY KS	0.0318	0.0015	0.0285	0.0366	2516000
117	TTL	100209.02	398	499	ELK CR. AT CLYDE KS	0.0307	0.0009	0.0292	0.0333	574700
118	TTL	100209.02	498	631	WHITE ROCK CRK NR BURR OAK KS	0.0262	0.0026	0.0218	0.0319	1532000
119	TTL	100209.02	602	733	TURKEY CREEK AT NAPONEE, NE.	0.0184	0.0010	0.0153	0.0197	673200
120	TTL	100209.02	576	703	CENTER CREEK AT FRANKLIN, NE	0.0190	0.0009	0.0165	0.0208	455800

Done



Interactive Snow Information

Get Time Series for Station ID: [Go](#) [Listing](#)

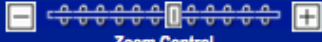
Get Time Series for Basin ID: [ABRFC](#) [Go](#) [Listing](#)

Get Basin Averages for [RFC](#) [Go](#) [Listing](#)

Get Climatology for Station ID: [Go](#) [Listing](#)

Navigation Tools

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Lon: -96.68 Lat: 39.79

[Recent map at coordinates](#)

Query

[Basin](#)

Redraw Map

Select Physical Element

Snow Water Equivalent

Select Date

2010 February

9 15:00 Z

- +

☒ Snap to nearest time

Select Overlays

Hydrologic Features

☒ Basins ☐ Label

☐ HUCs (6-digit)

☒ RFC Boundaries

☐ Major Rivers

☐ Rivers and Streams

☐ Lakes and Reservoirs

Political Features

☐ County Boundaries

☐ CWA Boundaries

☒ State Boundaries

☐ National Boundaries

Point Features

☒ Stations ☐ Label

☒ Cities ☐ Label

☐ Flight Lines ☐ Label

☐ Climate Stns. ☐ Label

☐ Skiing ☐ Label

Transportation Features

☐ Roads and Highways

Other features

☐ NSA Disc. Regions

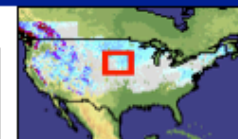
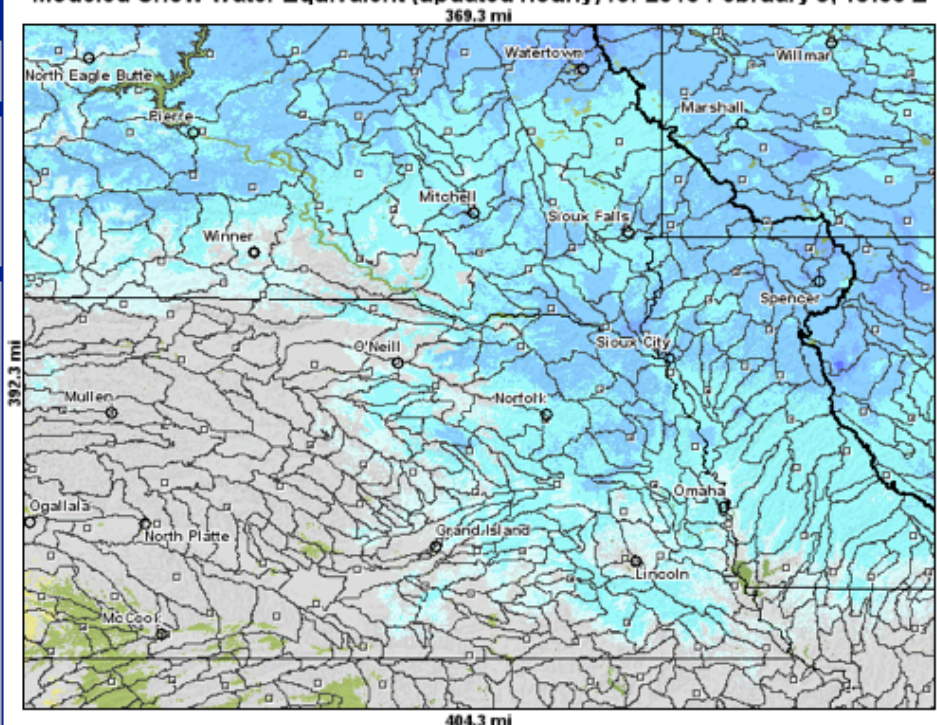
☐ NSA Disc. Subregions

☐ NSA Modelling Tiles

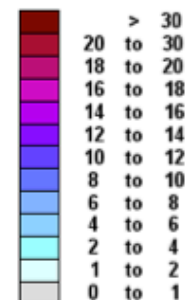
Map Preferences

English units

Modeled Snow Water Equivalent (updated hourly) for 2010 February 9, 15:00 Z



Inches of water equivalent



☐ Not Estimated

Elevation in feet
(Not estimated)



Model Adjustments:

A data assimilation as done across the upper Rio Grande through the Plains to Tennessee River basin on December 9. Our model over-produced snowfall from the most recent storm in this region, and there was some mis-typing of precipitation. Three-quarters to 1 1/4 inches of water was removed from the modeled snowpack in Kansas through western Missouri. One-half to 3/4 inch of water was also removed from the Llano Estacado and Caprock. Up to an inch of water was removed from Arkansas through western Tennessee.

Done



Interactive Snow Information

Get Time Series for Station ID: [Listing](#)
Get Time Series for Basin ID: [Listing](#)
Get Basin Averages for [Listing](#)
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Query Basin Time Series

River Forecast Center Region

Basin SHEF ID

px width

px height

Reference Map



Links

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Preferences

Start Date

to

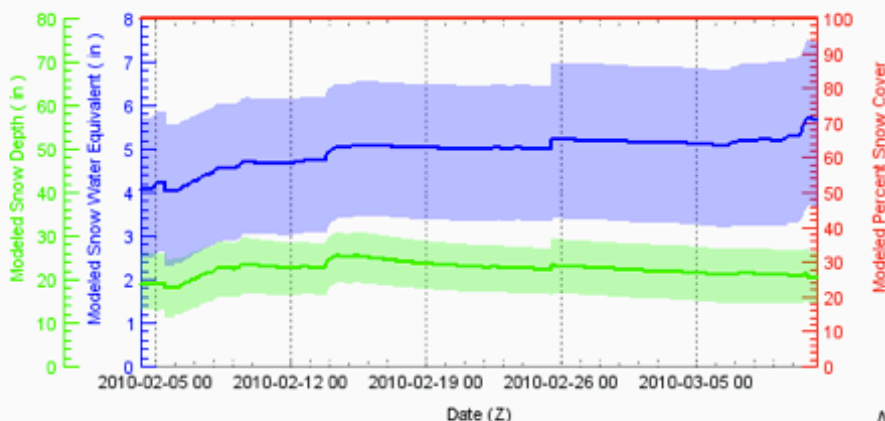
☐ Average of snow-covered area only

Basin Snow Cover Analysis

Modeled

SHEF ID: 821 - ROCK RIVER NR LUVERNE MN
RFC Name: MBRFC
Start Date: 2010-02-04 06
Stop Date: 2010-03-11 06
Basin Area: 420 sq. mi
(420 sq. mi modeled)

Average Modeled SWE
Min/Max Modeled SWE
Average Modeled Snow Depth
Min/Max Modeled Snow Depth
Modeled Percent Snow Cover
(Overlapping SWE and Snow Depth)



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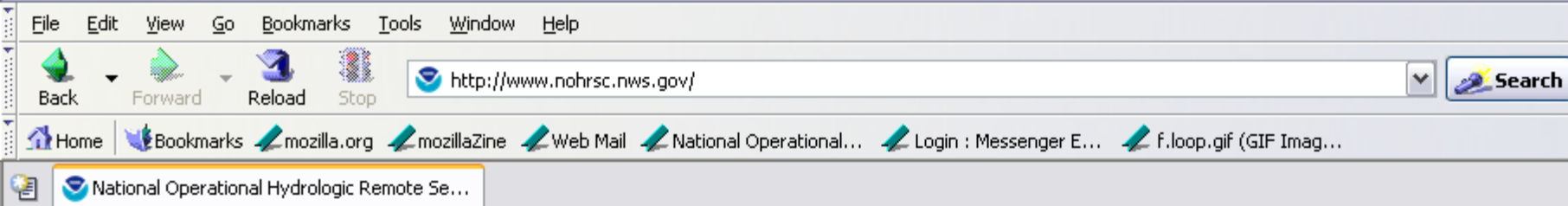
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[Interactive Maps](#)
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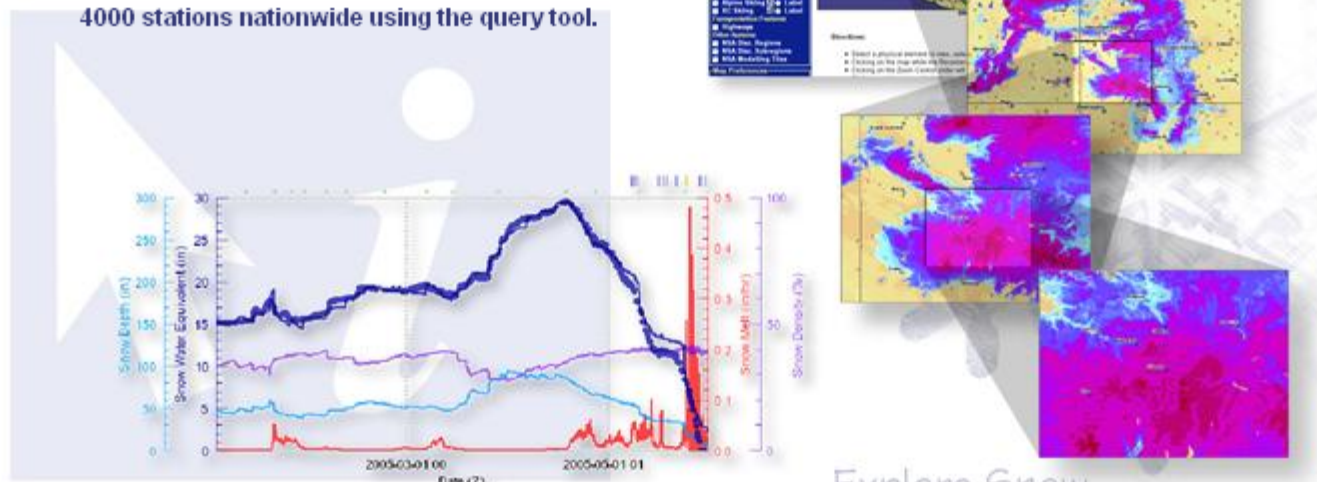


INTERACTIVE SNOW MAPS

Explore our online GIS for comprehensive snow information.

- Build custom maps for your region of interest
- Choose from over 40 snow themes
- Overlay roads, cities, rivers, etc.
- Query detailed conditions at over 20,000 locations

Get detailed snowpack conditions at over 4000 stations nationwide using the query tool.



Explore Snow



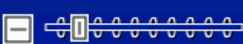
National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

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Comments

25.06 N, 81.70 W

Zoom

Query



Station (2002-present)

Redraw Map

Select Physical Element

Snow Water Equivalent

Select Date

2012 December

18 3:00 Z

☐ Snap to nearest time

Select Overlays

Hydrologic Features

- ☐ RFC Basins ☐ Label
- ☐ Other Basins ☐ Label
- ☐ HUCs (6-digit)
- ☐ RFC Boundaries
- ☐ Rivers and Streams
- ☐ Lakes and Reservoirs

Political Features

- ☐ County Boundaries
- ☐ CWA Boundaries
- ☒ State Boundaries
- ☐ National Boundaries

Point Features

- ☒ Stations ☐ Label
- ☒ Cities ☐ Label
- ☐ Flight Lines ☐ Label
- ☐ Climate Stns. ☐ Label
- ☐ Skiing ☐ Label

Transportation Features

- ☐ Roads and Highways

Other features

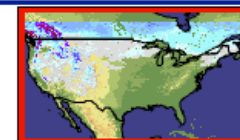
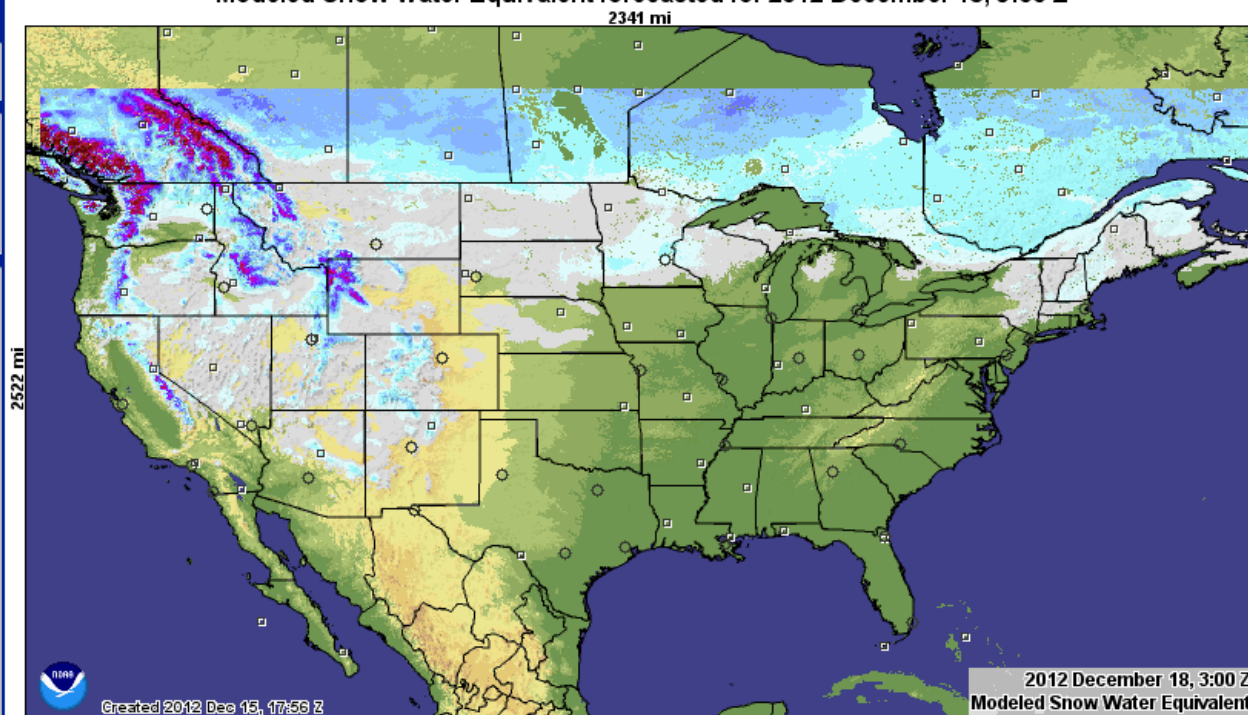
- ☐ NSA Disc. Regions
- ☐ NSA Disc. Subregions
- ☐ NSA Modelling Tiles

Map Preferences

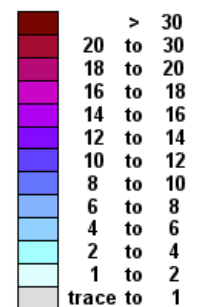
English units

☐ Legend below map☒ Background image

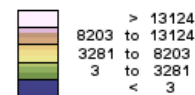
Modeled Snow Water Equivalent forecasted for 2012 December 18, 3:00 Z



Inches of water equivalent

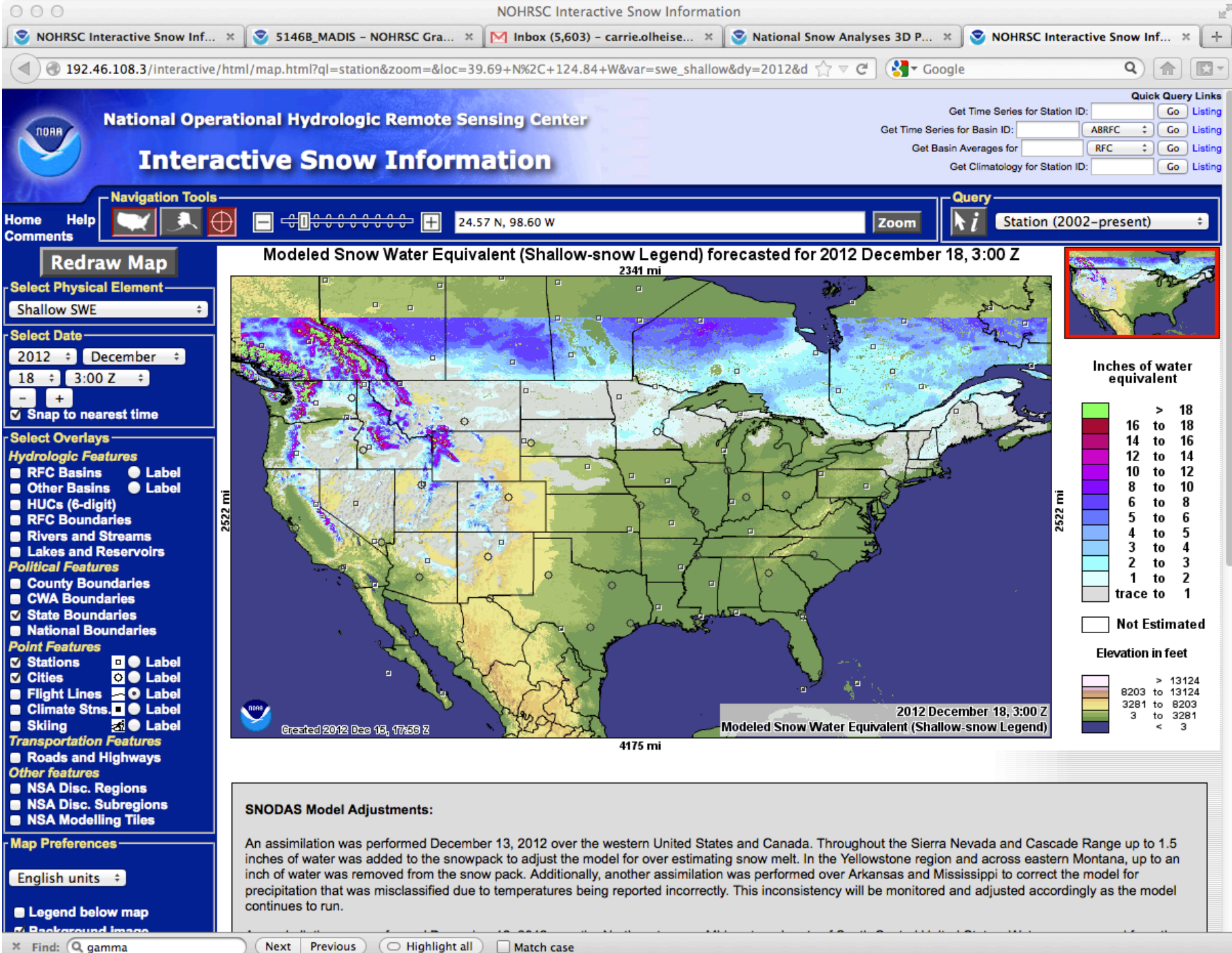
☐ Not Estimated

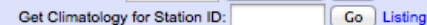
Elevation in feet



SNODAS Model Adjustments:

An assimilation was performed December 13, 2012 over the western United States and Canada. Throughout the Sierra Nevada and Cascade Range up to 1.5 inches of water was added to the snowpack to adjust the model for over estimating snow melt. In the Yellowstone region and across eastern Montana, up to an inch of water was removed from the snow pack. Additionally, another assimilation was performed over Arkansas and Mississippi to correct the model for precipitation that was misclassified due to temperatures being reported incorrectly. This inconsistency will be monitored and adjusted accordingly as the model continues to run.

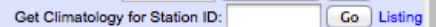




Station (2002–present)

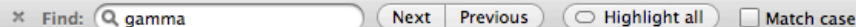
☒ Background image

Next Previous ☐ Highlight all ☐ Match case



Station (2002-present)

Find:





National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

Quick Query Links

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26.52 N, 80.07 W

Zoom

Query

Station (2002-present)

Redraw Map

Select Physical Element

SWE Change

Select Date

2012 December 18 6:00 Z - + ☒ Snap to nearest time

Select Overlays

Hydrologic Features

- ☐ RFC Basins ☐ Label
- ☐ Other Basins ☐ Label
- ☐ HUCs (6-digit) ☐ Label
- ☐ RFC Boundaries
- ☐ Rivers and Streams
- ☐ Lakes and Reservoirs

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- ☐ CWA Boundaries
- ☐ State Boundaries
- ☐ National Boundaries

Point Features

- ☒ Stations ☐ Label
- ☒ Cities ☐ Label
- ☐ Flight Lines ☐ Label
- ☐ Climate Stns. ☐ Label
- ☐ Skiing ☐ Label

Transportation Features

- ☐ Roads and Highways

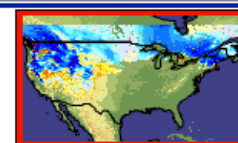
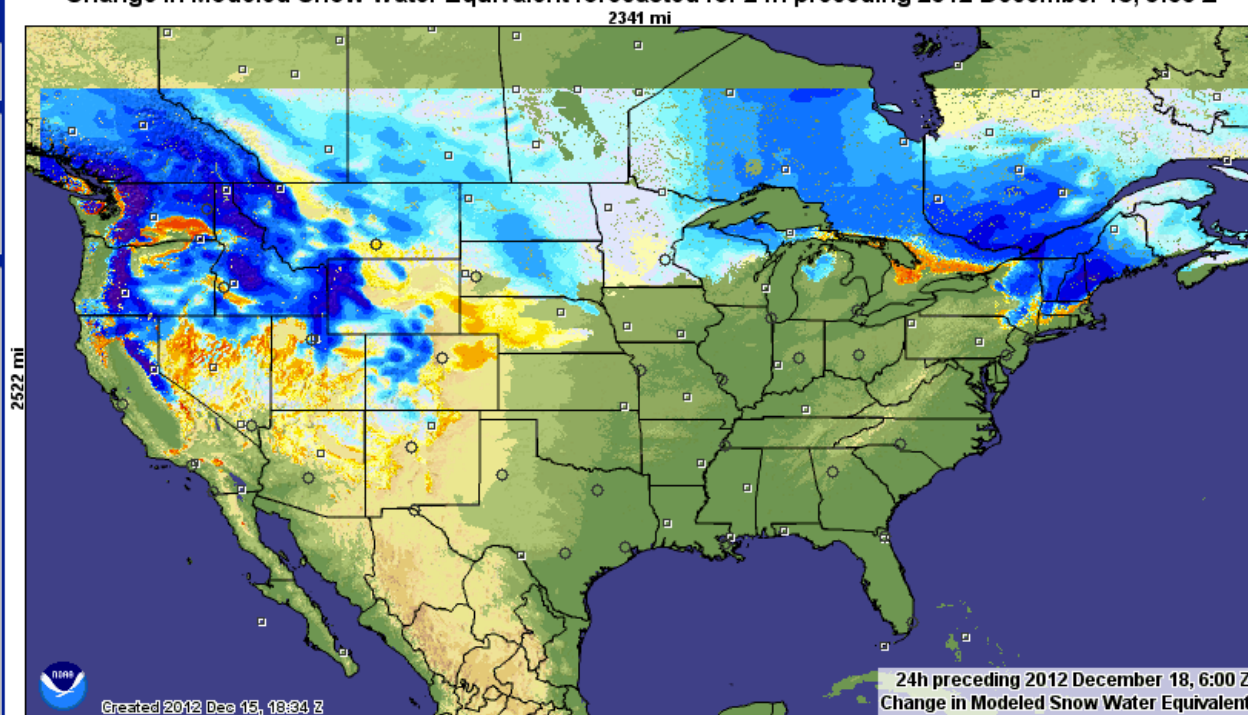
Other features

- ☐ NSA Disc. Regions
- ☐ NSA Disc. Subregions
- ☐ NSA Modelling Tiles

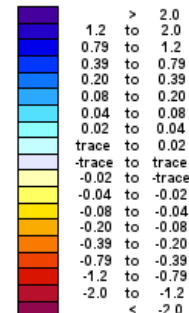
Map Preferences

English units ☐ Legend below map☒ Background image

Change in Modeled Snow Water Equivalent forecasted for 24h preceding 2012 December 18, 6:00 Z



Inches of water equivalent

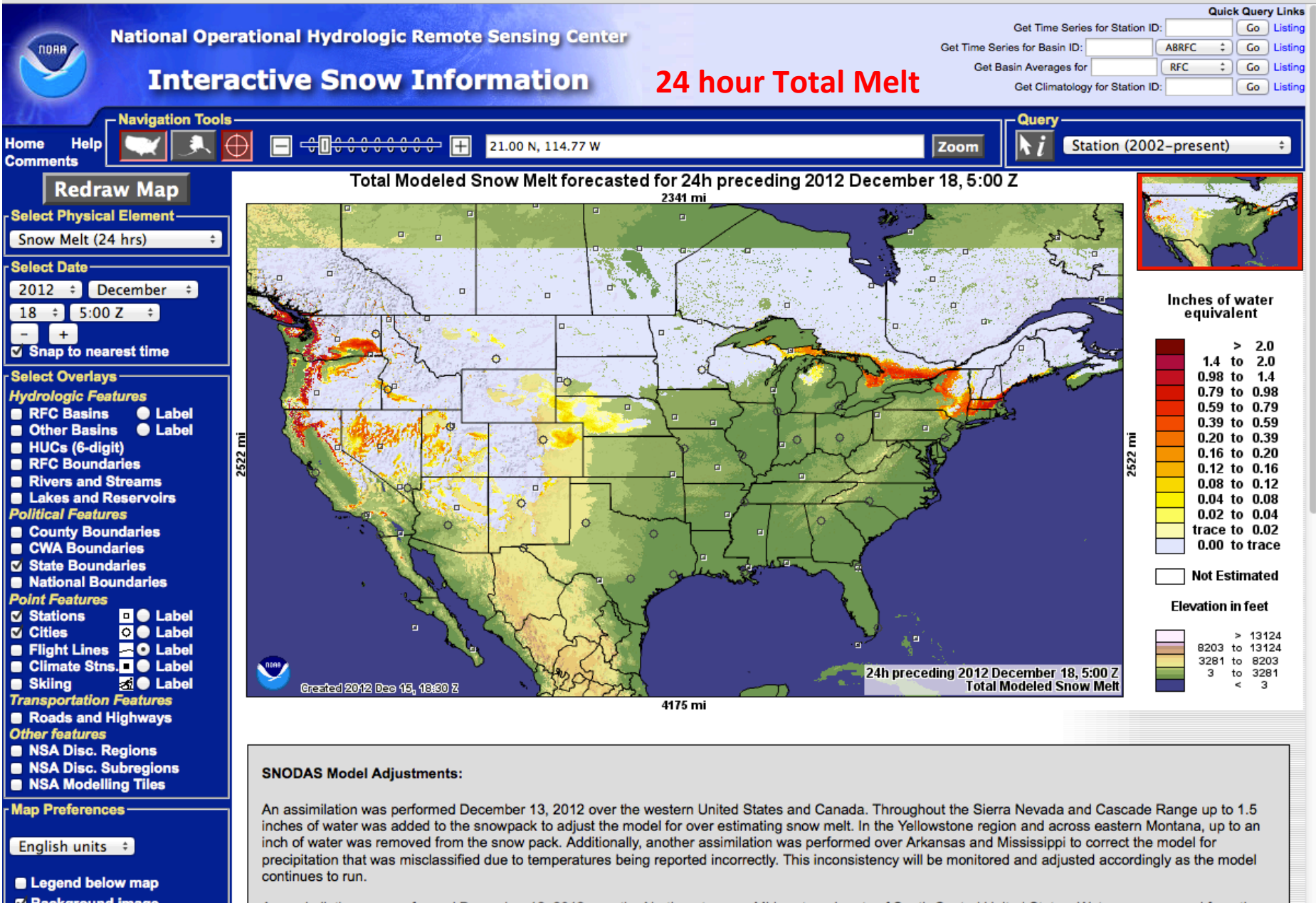
☐ Not Estimated

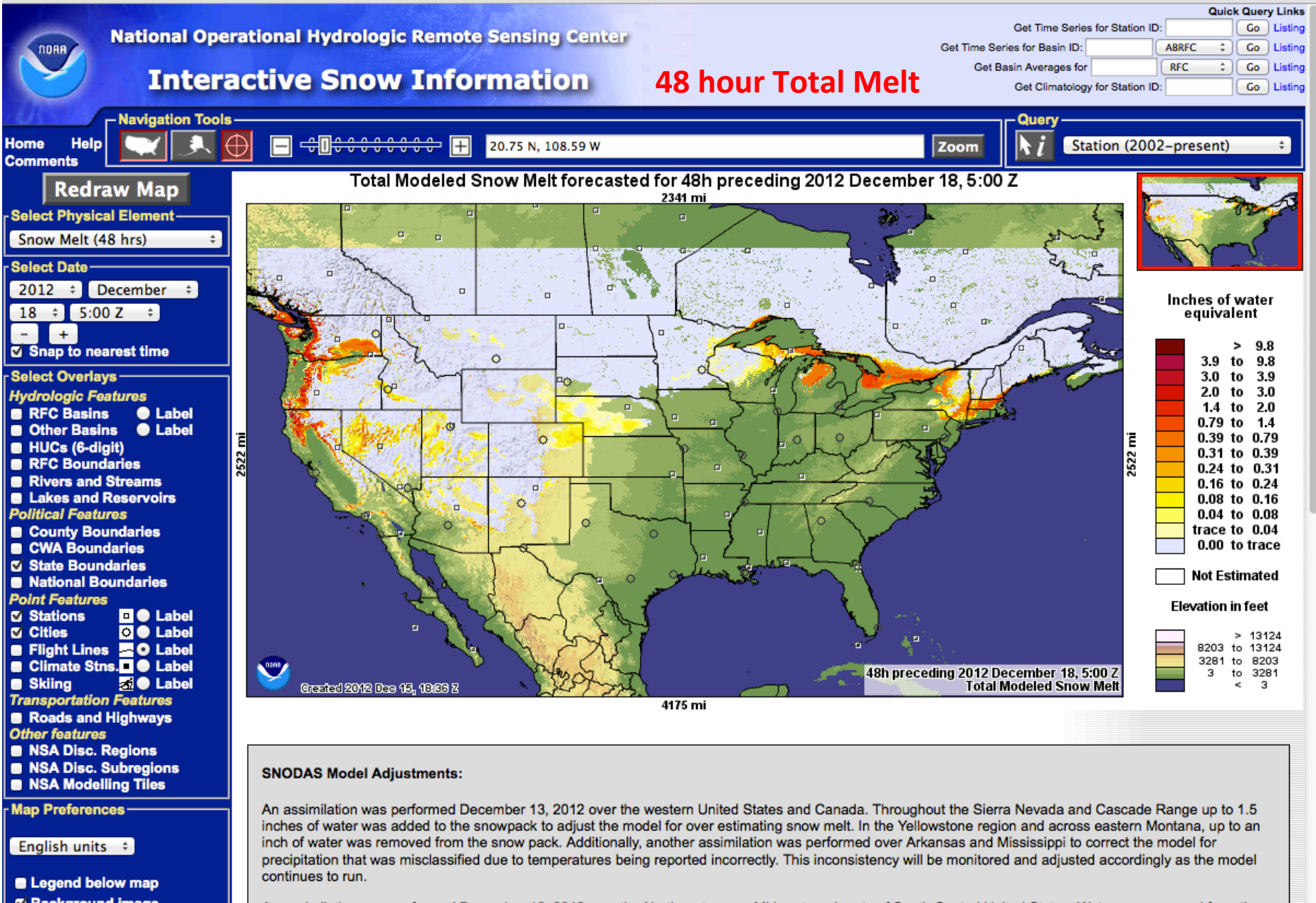
Elevation in feet




SNODAS Model Adjustments:

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National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

72 hour Total Melt

Quick Query Links

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



















Get Time Series for Basin ID: [Go](#) [Listing](#)

Get Basin Averages for [Go](#) [Listing](#)

Get Climatology for Station ID: [Go](#) [Listing](#)

Navigation Tools

Home Help Comments



National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

Quick Query Links

Get Time Series for Station ID: Go [Listing](#)Get Time Series for Basin ID: ABRFC [Listing](#)Get Basin Averages for RFC [Listing](#)Get Climatology for Station ID: Go [Listing](#)

Navigation Tools

[Home](#) [Help](#)
[Comments](#)

21.97 N, 97.14 W

Zoom

Query

Station (2002-present)

Redraw Map

Select Physical Element

Snow Temperature

Select Date

2012 December 17 6:00 Z - + ☒ Snap to nearest time

Select Overlays

Hydrologic Features

- ☐ RFC Basins ☐ Label
- ☐ Other Basins ☐ Label
- ☐ HUCs (6-digit)
- ☐ RFC Boundaries
- ☐ Rivers and Streams
- ☐ Lakes and Reservoirs

Political Features

- ☐ County Boundaries
- ☐ CWA Boundaries
- ☒ State Boundaries
- ☐ National Boundaries

Point Features

- ☒ Stations ☐ Label
- ☒ Cities ☐ Label
- ☐ Flight Lines ☐ Label
- ☐ Climate Stns. ☐ Label
- ☐ Skiing ☐ Label

Transportation Features

- ☐ Roads and Highways

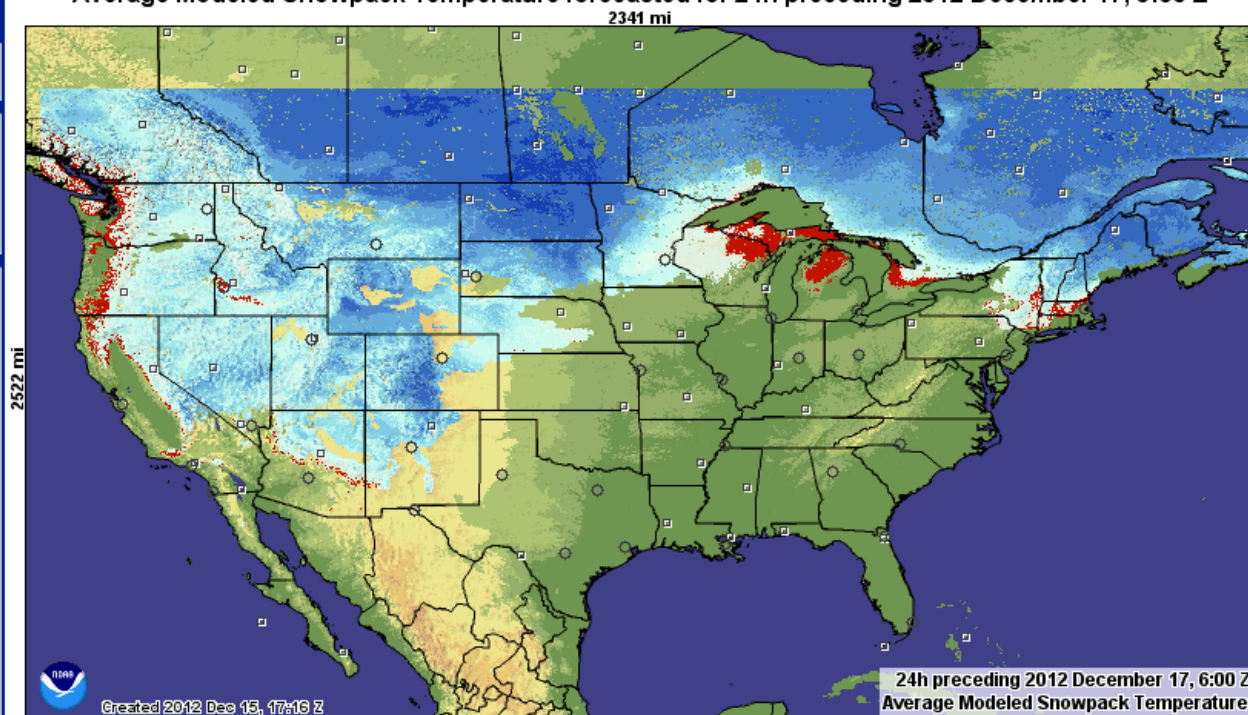
Other features

- ☐ NSA Disc. Regions
- ☐ NSA Disc. Subregions
- ☐ NSA Modelling Tiles

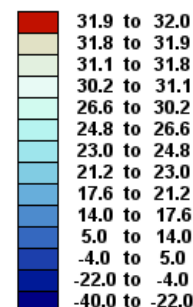
Map Preferences

English units ☐ Legend below map☒ Background image

Average Modeled Snowpack Temperature forecasted for 24h preceding 2012 December 17, 6:00 Z



Degrees Fahrenheit

☐ Not Estimated

Elevation in feet



SNODAS Model Adjustments:

An assimilation was performed December 13, 2012 over the western United States and Canada. Throughout the Sierra Nevada and Cascade Range up to 1.5 inches of water was added to the snowpack to adjust the model for over estimating snow melt. In the Yellowstone region and across eastern Montana, up to an inch of water was removed from the snow pack. Additionally, another assimilation was performed over Arkansas and Mississippi to correct the model for precipitation that was misclassified due to temperatures being reported incorrectly. This inconsistency will be monitored and adjusted accordingly as the model continues to run.



National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

Quick Query Links

Get Time Series for Station ID: Go [Listing](#)Get Time Series for Basin ID: ABRFC [Listing](#)Get Basin Averages for RFC [Listing](#)Get Climatology for Station ID: Go [Listing](#)

Navigation Tools

[Home](#) [Help](#)
[Comments](#)

22.30 N, 81.05 W

Zoom

Query

Station (2002-present)

Redraw Map

Select Physical Element

Snow Temperature

Select Date

2012 December 18 6:00 Z
☒ Snap to nearest time

Select Overlays

Hydrologic Features

- ☐ RFC Basins ☐ Label
- ☐ Other Basins ☐ Label
- ☐ HUCs (6-digit)
- ☐ RFC Boundaries
- ☐ Rivers and Streams
- ☐ Lakes and Reservoirs

Political Features

- ☐ County Boundaries
- ☐ CWA Boundaries
- ☒ State Boundaries
- ☐ National Boundaries

Point Features

- ☒ Stations ☐ Label
- ☒ Cities ☐ Label
- ☐ Flight Lines ☐ Label
- ☐ Climate Stns. ☐ Label
- ☐ Skiing ☐ Label

Transportation Features

- ☐ Roads and Highways

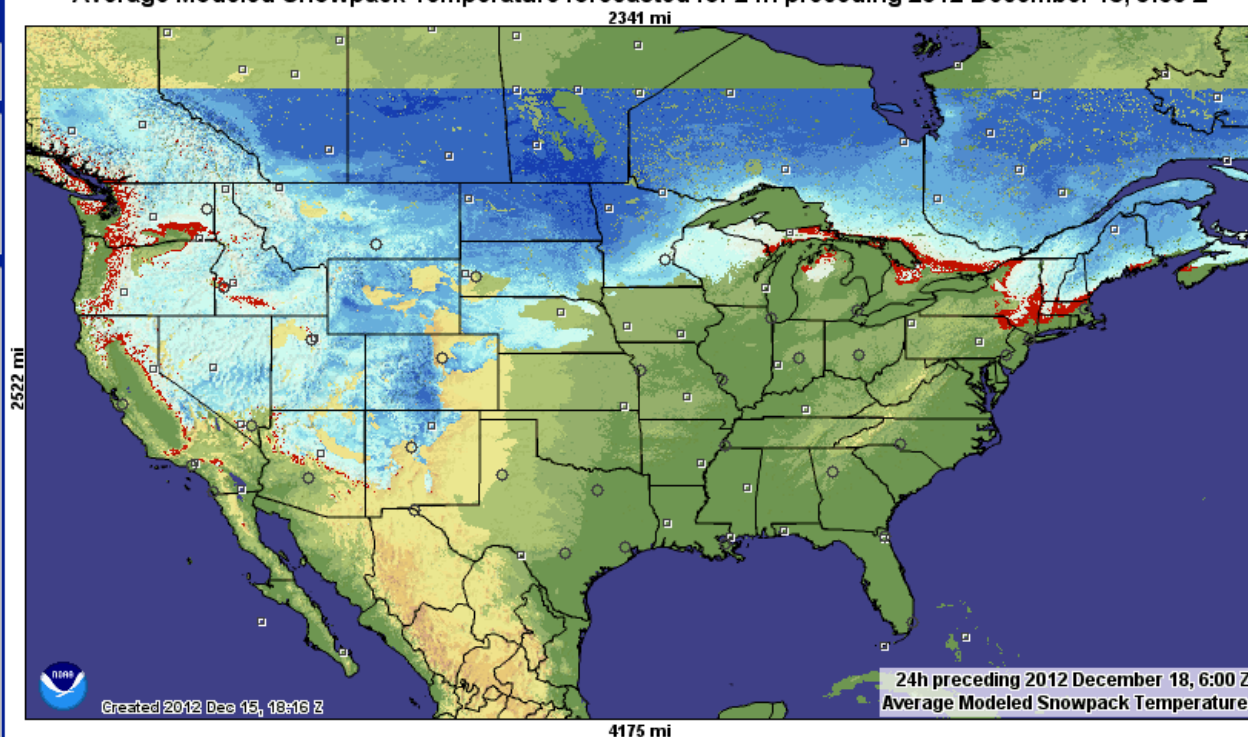
Other features

- ☐ NSA Disc. Regions
- ☐ NSA Disc. Subregions
- ☐ NSA Modelling Tiles

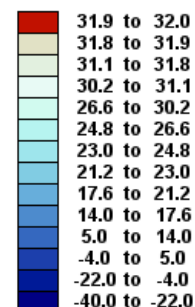
Map Preferences

English units ☐ Legend below map☒ Background image

Average Modeled Snowpack Temperature forecasted for 24h preceding 2012 December 18, 6:00 Z



Degrees Fahrenheit

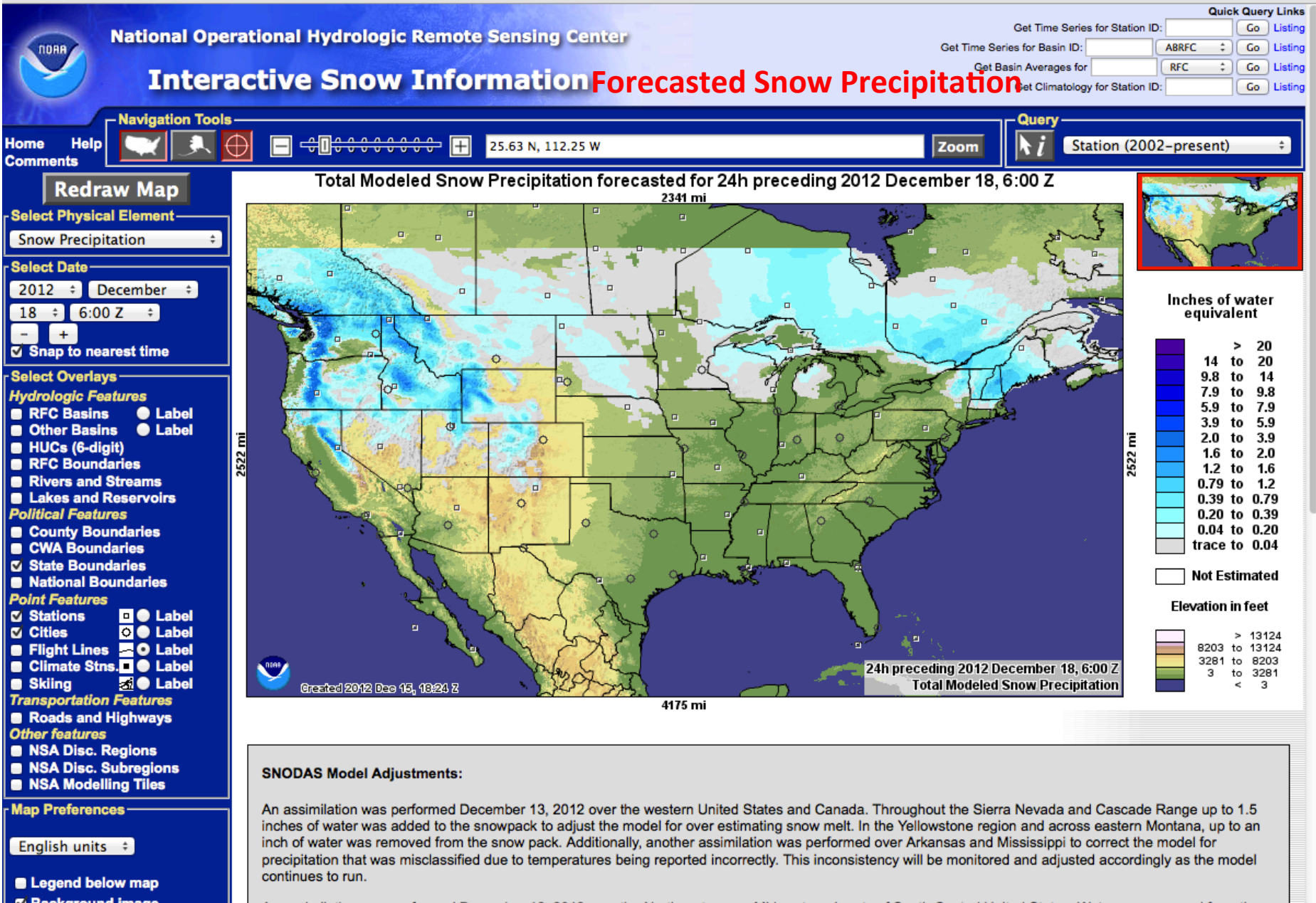
☐ Not Estimated

Elevation in feet



SNODAS Model Adjustments:

An assimilation was performed December 13, 2012 over the western United States and Canada. Throughout the Sierra Nevada and Cascade Range up to 1.5 inches of water was added to the snowpack to adjust the model for over estimating snow melt. In the Yellowstone region and across eastern Montana, up to an inch of water was removed from the snow pack. Additionally, another assimilation was performed over Arkansas and Mississippi to correct the model for precipitation that was misclassified due to temperatures being reported incorrectly. This inconsistency will be monitored and adjusted accordingly as the model continues to run.



Physical Element Map Options

The screenshot displays the 'Physical Element Map Options' interface. At the top left is a 'Redraw Map' button. Below it is a 'Select Physical Element' dropdown menu currently set to 'Snow Precipitation'. The main area contains four vertical panels of options:

- Left Panel:**
 - None
 - Hourly Snow Analyses**
 - Snow Water Equivalent
 - Snow Depth
 - Shallow SWE
 - Shallow Snow Depth
 - Snowpack Temperature
 - Snowpack Density
 - Snow Melt
 - Hourly Driving Data**
 - Snow Precipitation
 - Non-Snow Precipitation
 - Surface Air Temperature
 - Solar Radiation
 - Relative Humidity
 - Surface Wind
 - Daily Snow Analyses**
 - Snow Depth - Normal
 - SWE Change
- Second Panel:**
 - Daily Snow Analyses**
 - Snow Depth - Normal
 - SWE Change
 - Snow Depth Change
 - Snow Melt
 - Blowing Snow Sublim.
 - Surface Sublim./Cond.
 - Ave. Snow Temperature
 - Daily Driving Data**
 - Snow Precipitation
 - Non-Snow Precipitation
 - Ave. Relative Humidity
 - Ave. Surface Air Temp.
 - Solar Radiation
 - Average Surface Wind
 - Daily Satellite Obs.**
 - Snow Cover (Percent)
 - Snow Cover (Binary)
 - Snow Cover (Alaska)
 - Climate Data**
- Third Panel:**
 - Climate Data**
 - Freezing Degree Days
 - Thawing Degree Days
 - Monthly Depth Normal
 - Soil Moisture**
 - Soil Moisture (surface)
 - Soil Moisture (5 cm)
 - Soil Moisture (20 cm)
 - Soil Moisture (40 cm)
 - Soil Moisture (160 cm)
 - Soil Moisture (300 cm)
 - Latest Observations**
 - Snow Depth (24 hrs)
 - Snow Depth (48 hrs)
 - Snow Depth (72 hrs)
 - SWE (24 hrs)** (circled in red)
 - SWE (48 hrs)
 - SWE (72 hrs)
 - Total Snowfall (24 hrs)
 - Total Snowfall (48 hrs)
- Right Panel:**
 - Total Snowfall (48 hrs)
 - Total Snowfall (72 hrs)
 - Int. Total SF (24 hrs)
 - Int. Total SF (48 hrs)
 - Int. Total SF (72 hrs)
 - Raw S. Depth (5 hrs)
 - Raw SWE (5 hrs)
 - Raw Snowfall (24 hrs)
 - Raw Precip (24 hrs)
 - Total Precip (24 hrs)
 - Total Precip (48 hrs)
 - Total Precip (72 hrs)
 - Air Temp. (24 hrs)
 - Wind Speed (24 hrs)
 - Air Temperature** (highlighted)
 - Wind Speed
 - Static Data**
 - Elevation
 - Forest Density
 - Land-Water Mask

A red circle highlights 'SWE (24 hrs)' in the 'Latest Observations' section of the third panel. A tooltip 'Select a p' is visible near the 'SWE Change' option in the second panel.



National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

Quick Query Links

Get Time Series for Station ID: Go [Listing](#)Get Time Series for Basin ID: ABRFC Go [Listing](#)Get Basin Averages for RFC Go [Listing](#)Get Climatology for Station ID: Go [Listing](#)

Navigation Tools

[Home](#) [Help](#)
[Comments](#)

20.83 N, 118.18 W

Zoom

Query

Station (2002-present)

Redraw Map

Select Physical Element

SWE (24 hrs)

Select Date

2012 December 17 6:00 Z ☒ Snap to nearest time

Select Overlays

Hydrologic Features

- ☐ RFC Basins ☐ Label
- ☐ Other Basins ☐ Label
- ☐ HUCs (6-digit) ☐ Label
- ☐ RFC Boundaries
- ☐ Rivers and Streams
- ☐ Lakes and Reservoirs

Political Features

- ☐ County Boundaries
- ☐ CWA Boundaries
- ☒ State Boundaries
- ☐ National Boundaries

Point Features

- ☒ Stations ☐ Label
- ☒ Cities ☐ Label
- ☐ Flight Lines ☐ Label
- ☐ Climate Stns. ☐ Label
- ☐ Skiing ☐ Label

Transportation Features

- ☐ Roads and Highways

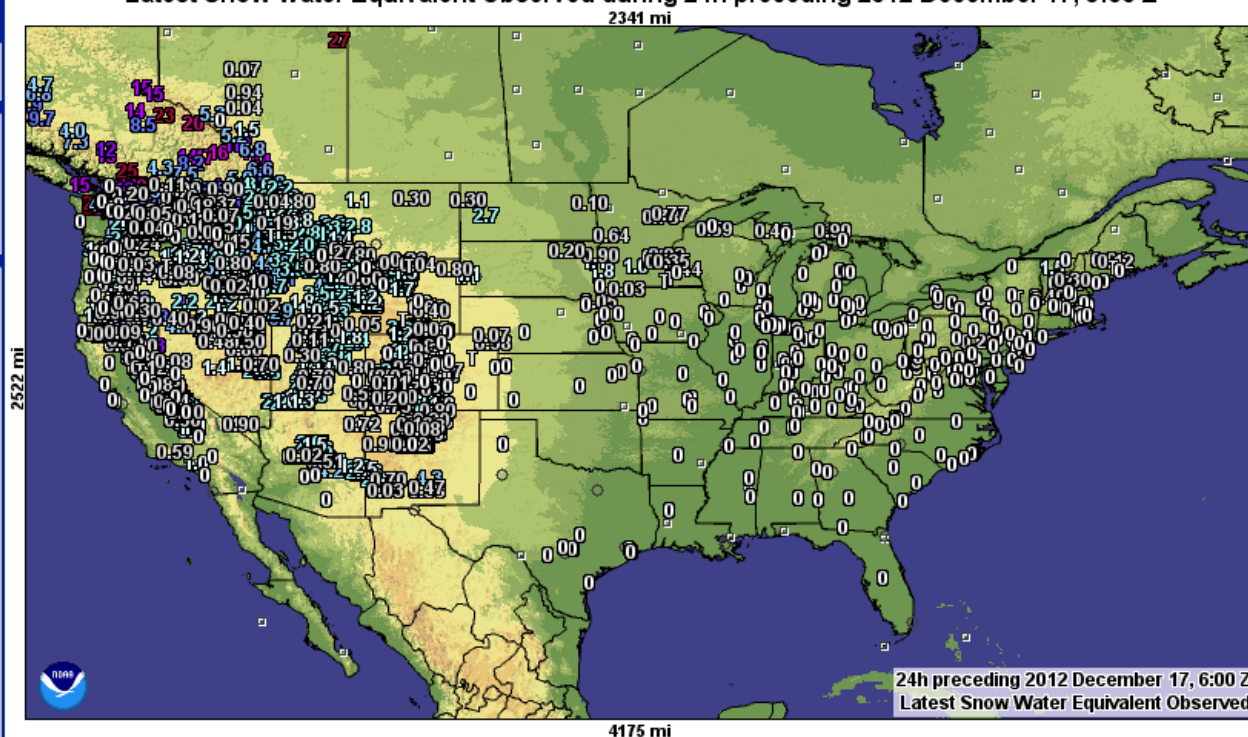
Other features

- ☐ NSA Disc. Regions
- ☐ NSA Disc. Subregions
- ☐ NSA Modelling Tiles

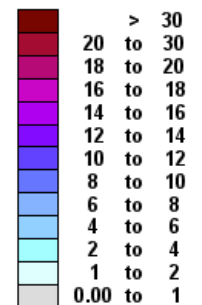
Map Preferences

English units ☐ Legend below map☒ Background image

Latest Snow Water Equivalent Observed during 24h preceding 2012 December 17, 6:00 Z



Inches of water equivalent

☐ Not Estimated

Elevation in feet



SNODAS Model Adjustments:

An assimilation was performed December 13, 2012 over the western United States and Canada. Throughout the Sierra Nevada and Cascade Range up to 1.5 inches of water was added to the snowpack to adjust the model for over estimating snow melt. In the Yellowstone region and across eastern Montana, up to an inch of water was removed from the snow pack. Additionally, another assimilation was performed over Arkansas and Mississippi to correct the model for precipitation that was misclassified due to temperatures being reported incorrectly. This inconsistency will be monitored and adjusted accordingly as the model continues to run.



National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

Quick Query Links

Get Time Series for Station ID: Go [Listing](#)Get Time Series for Basin ID: ABRFC [Listing](#)Get Basin Averages for RFC [Listing](#)Get Climatology for Station ID: Go [Listing](#)

Navigation Tools

[Home](#) [Help](#)
[Comments](#)

24.33 N, 91.20 W

Zoom

Query

Station (2002-present)

Redraw Map

Select Physical Element

Snow Depth (24 hrs)

Select Date

2012 December 17 6:00 Z
☒ Snap to nearest time

Select Overlays

Hydrologic Features

- ☐ RFC Basins ☐ Label
- ☐ Other Basins ☐ Label
- ☐ HUCs (6-digit) ☐ Label
- ☐ RFC Boundaries
- ☐ Rivers and Streams
- ☐ Lakes and Reservoirs

Political Features

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- ☐ CWA Boundaries
- ☒ State Boundaries
- ☐ National Boundaries

Point Features

- ☒ Stations ☐ Label
- ☒ Cities ☐ Label
- ☐ Flight Lines ☐ Label
- ☐ Climate Stns. ☐ Label
- ☐ Skiing ☐ Label

Transportation Features

- ☐ Roads and Highways

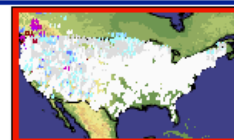
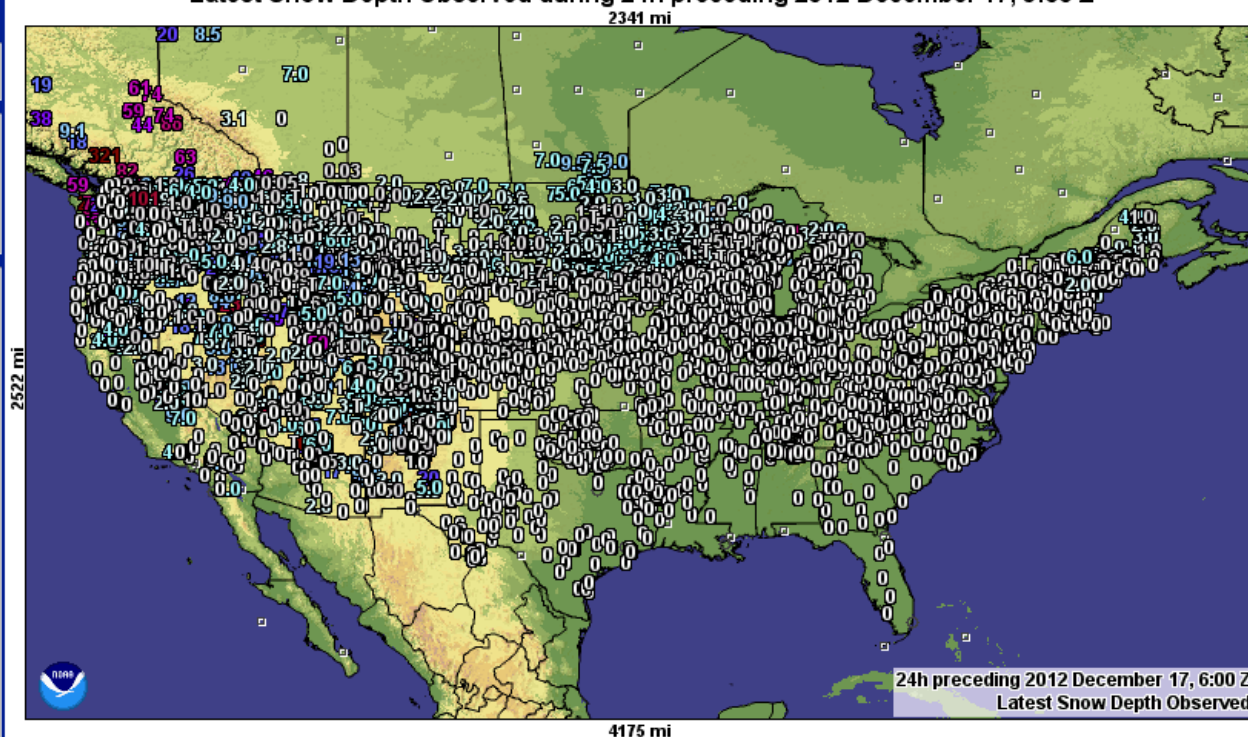
Other features

- ☐ NSA Disc. Regions
- ☐ NSA Disc. Subregions
- ☐ NSA Modelling Tiles

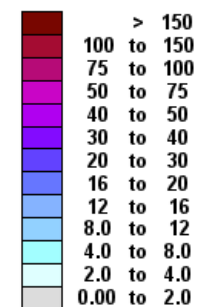
Map Preferences

English units ☐ Legend below map☒ Background image

Latest Snow Depth Observed during 24h preceding 2012 December 17, 6:00 Z



Inches of depth


☐ Not Estimated

Elevation in feet



SNODAS Model Adjustments:

An assimilation was performed December 13, 2012 over the western United States and Canada. Throughout the Sierra Nevada and Cascade Range up to 1.5 inches of water was added to the snowpack to adjust the model for over estimating snow melt. In the Yellowstone region and across eastern Montana, up to an inch of water was removed from the snow pack. Additionally, another assimilation was performed over Arkansas and Mississippi to correct the model for precipitation that was misclassified due to temperatures being reported incorrectly. This inconsistency will be monitored and adjusted accordingly as the model continues to run.



National Operational Hydrologic Remote Sensing Center

Interactive Snow Information

Quick Query Links

Get Time Series for Station ID: [Go](#) [Listing](#)
























Get Time Series for Basin ID: [Go](#) [Listing](#)

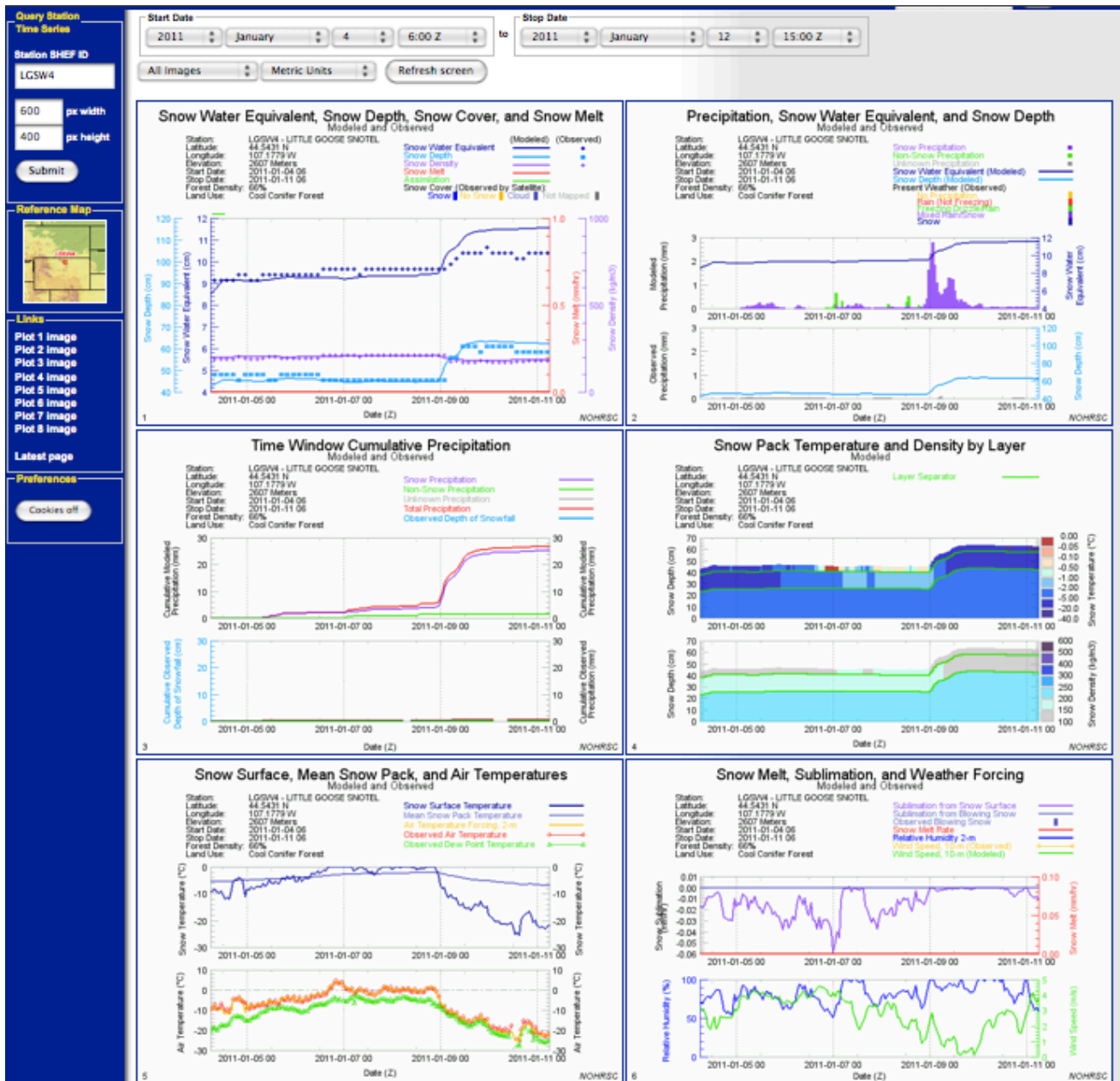
Get Basin Averages for [Go](#) [Listing](#)

Get Climatology for Station ID: [Go](#) [Listing](#)

Navigation Tools

Home Help Comments



Done

Time Series

Station SHEF ID
PGPW1

600 px width
400 px height

Submit



Links

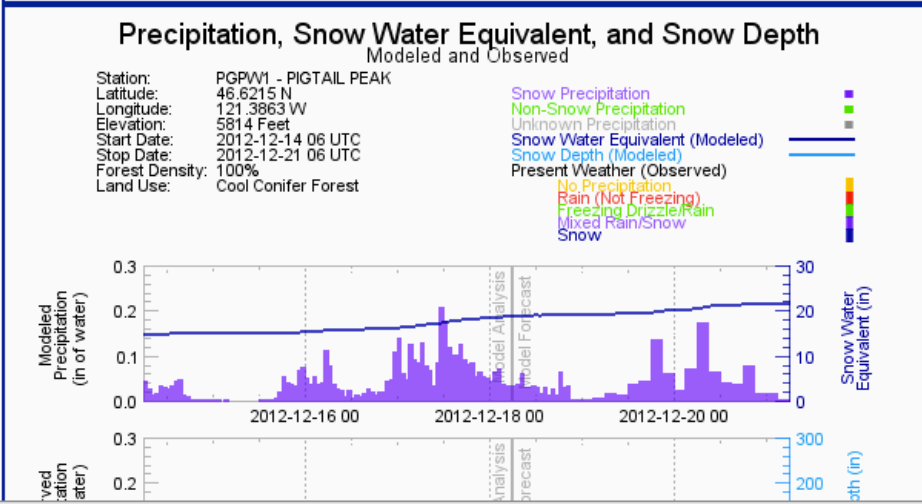
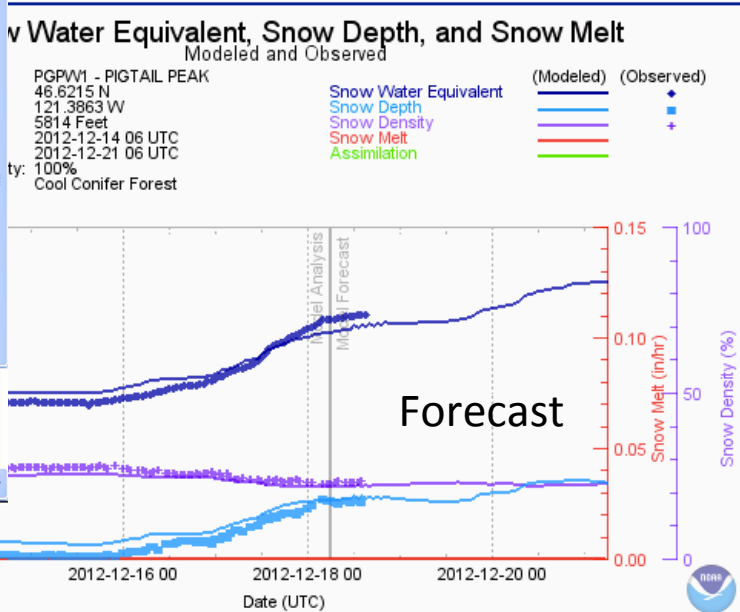
Preferences

Cookies off

2012 December 14 6:00 Z to 2012 December 21 6:00 Z

All Images English Units Refresh screen More information on station PGPW1

- All Images
- Plot 1 Data
- Plot 2 Data
- Plot 3 Data
- Plot 4 Data
- Plot 5 Data
- Plot 6 Data
- Plot 7 Data
- Plot 8 Data
- Plot 1 Image
- Plot 2 Image
- Plot 3 Image
- Plot 4 Image
- Plot 5 Image
- Plot 6 Image
- Plot 7 Image
- Plot 8 Image
- Plot 1 CSV file
- Plot 2 CSV file
- Plot 3 CSV file





Interactive Snow Information

Navigation Tools

Home Help
Comments



Zoom Control

Lon: -101.01

Lat: 38.83

Recenter map at coordinates

Redraw Map

Select Physical Element

SWE (72 hrs)

Select Date

2011 January

12 6:00 Z

- +

☒ Snap to nearest time

Select Overlays

Hydrologic Features

- ☐ Basins ☐ Label
- ☐ HUCs (6-digit)
- ☐ RFC Boundaries
- ☐ Major Rivers
- ☐ Rivers and Streams
- ☐ Lakes and Reservoirs

Political Features

- ☐ County Boundaries
- ☐ CWA Boundaries
- ☒ State Boundaries
- ☐ National Boundaries

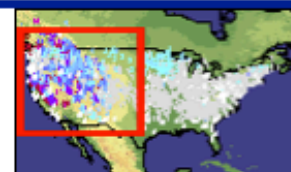
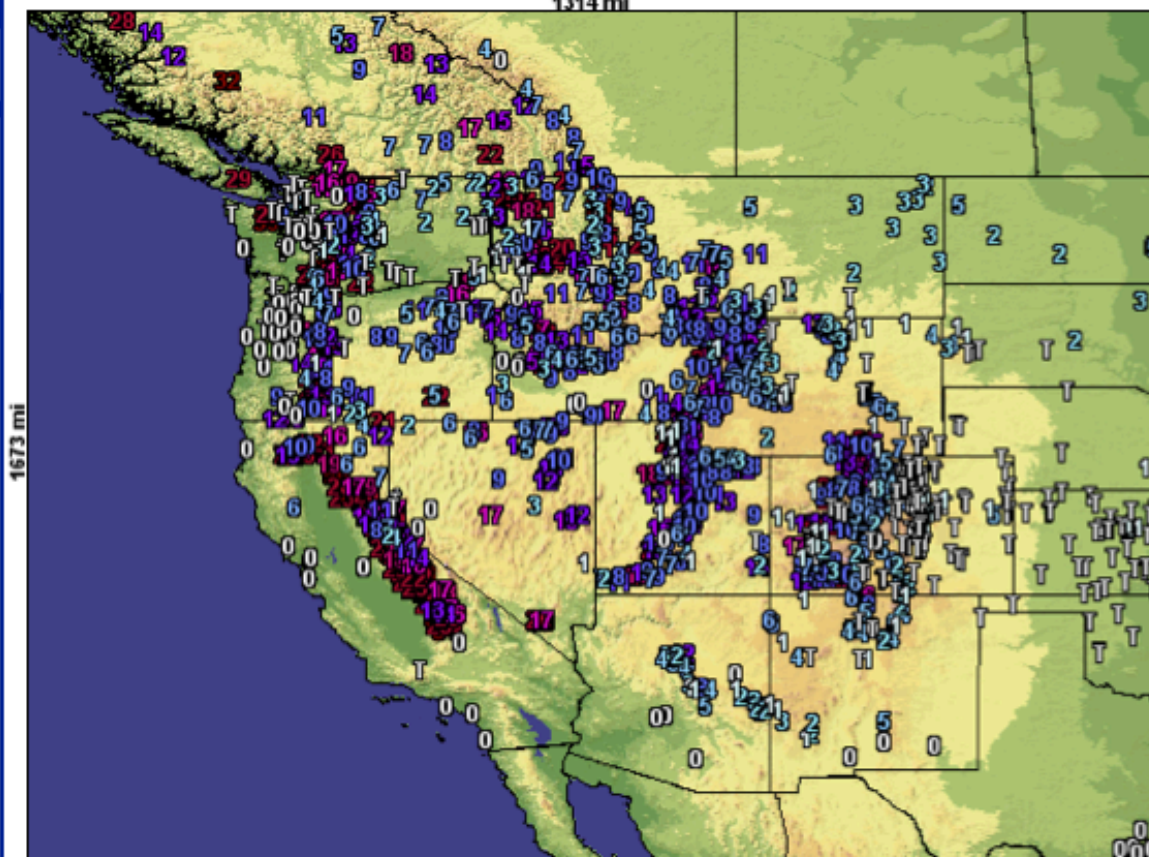
Point Features

- ☐ Stations ☐ Label
- ☐ Cities ☐ Label
- ☐ Flight Lines ☐ Label
- ☐ Climate Stns. ☐ Label
- ☐ Skiing ☐ Label

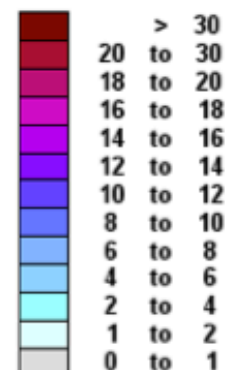
Transportation Features

- ☐ Roads and Highways

Latest Snow Water Equivalent Observed during 72h preceding 2011 January 12, 6:00 Z
1314 mi

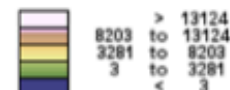


Inches of water
equivalent



☐ Not Estimated

Elevation in feet
(Not estimated)



1942 mi

move toward the middle Atlantic coast. Four to six inches of snow are likely in the southern Great Lakes region, with up to a foot possible in northern Virginia through central Maryland. Light freezing rain is possible on the southern side of this snowband, roughly from western North Carolina through eastern Maryland.

Rapid deepening of the combined low will continue as the low moves offshore by Thursday. A foot of snowfall is likely over a small area of the East Coast, roughly from northern Virginia through eastern Massachusetts. At least 4 inches of snowfall is likely from Lake Erie through southern New Hampshire, south to eastern Virginia and in West Virginia. The system will be far enough to see that little precipitation is expected on Thursday.

A weak surface low will move into the Southwest from the Pacific today and bring up to a half-foot of snowfall to the southern Sierra Nevada. Widespread light precipitation is expected across the Southwest tomorrow. By Thursday, the low and its associated upper trough will move into the southern Plains, and a surface low is expected to spin up in the northwestern Gulf Coast. Sufficiently-cold air will be in place over the southern Plains to cause up to 1/2 foot of snowfall along the lower Red River on Thursday, with 1/2 to 1 inch of rainfall possible farther south from eastern Texas through Mississippi. This system will move eastward across the northern Gulf during the rest of the week and is expected to hook northeastward to the East Coast by the weekend.

Snow Reports

Top Ten:

Metric Units...

Station ID	Name	Elevation (feet)	Snowfall (in)	Duration (hours)	Report Date / Time(UTC)
LCVP1	LAUREL CAVERNS	2717	34.000	48	2010-02-08 12
0620H_MADIS	ANGEL FIRE 0.2 SSE, NM	8530	13.000	24	2010-02-08 14
AGFN5	ANGEL FIRE - INACT	8648	12.000	24	2010-02-08 22
1539C_MADIS	OURAY .23 NNW, CO	7740	10.100	24	2010-02-08 15
URYC2	QURAY SPOTTER	7733	10.100	24	2010-02-08 15
7086A_MADIS	CRIPPLE CREEK 5.1 NW, CO	8533	10.000	24	2010-02-08 15
EADC2	EADS, CO	4226	10.000	24	2010-02-08 14
GARO1	UNKNOWN	1030	10.000	24	2010-02-08 12
WSAC2	SKI AREA	11345	10.000	24	2010-02-08 14
MSCI4	MASON CITY #1	1132	5.000	12	2010-02-09 05

Note: these data are unofficial and provisional.

Zip codes (where available) of observations will be included in text files after October 7, 2008.

[Station Snowfall Reports](#)

[Station Snow Water Equivalent Reports](#)


[Station Snowdepth Reports](#)

Model Assimilation

A data assimilation as done across the upper Rio Grande through the Plains to Tennessee River basin on December 9. Our model over-produced snowfall from the most recent storm in this region, and there was some mis-typing of precipitation. Three-quarters to 1 1/4 inches of water was removed from the modeled snowpack in Kansas through western Missouri. One-half to 3/4 inch of water was also removed from the Llano Estacado and Caprock. Up to an inch of water was removed from Arkansas through western Tennessee.

NOHRSC Airborne Snow Survey Program

The Airborne program has no scheduled flights in this region for the week of February 08, 2010.



National Weather Service

National Operational Hydrologic Remote Sensing Center

[Home](#)
[News](#)
[Organization](#)

[Back to Snow Analyses](#)
[Observation Search](#)

National Snow Water Equivalent Observations from 2010-02-08 07:00 Z to 2010-02-09 06:00 Z

Note: these data are unofficial and provisional.
Latitude and longitude of observations will be included in text files after December 1, 2006.

[Text file with Metric units](#)
[Text file with English units](#)
[Table with Metric Units](#)

Station ID	Date (UTC)	Value (in)	Elevation (feet)	Station Description
LLPC1	2010-02-09 06	72.340	8248	LOWER LASSEN PEAK SNOW COURSE
EPSW1	2010-02-09 06	65.500	5249	21A07 - EASY PASS AM
SLTC1	2010-02-08 12	53.900	5712	SLATE CREEK
RRMC1	2010-02-08 12	47.100	6260	RED ROCK MOUNTAIN
SHMC1	2010-02-08 12	46.800	6411	SHIMMY LAKE GOES
HGCI1	2010-02-08 12	45.200	5922	HIGHLANDS LAKES GOES
BKHW1	2010-02-09 06	44.800	4633	BUCKINGHORSE
SDFC1	2010-02-08 12	44.100	6827	SAND FLAT
SWCV1	2010-02-09 06	42.400	4491	SWIFT CREEK
BNKC1	2010-02-08 12	41.000	5846	BONANZA KING
BKLC1	2010-02-09 06	40.800	5771	BUCKS LAKE
HRKC1	2010-02-09 06	40.700	4534	HARKNESS FLAT
STMC1	2010-02-08 12	40.300	5299	STOUTS MEADOW GOES
TAHQ2	2010-02-09 06	38.770	5184	TAHTSA LAKE WEST SNOW PILLOW
AFSW1	2010-02-09 06	38.300	5151	PARADISE
MTCQ2	2010-02-09 06	37.800	5180	MOUNT COOK
SZKQ2	2010-02-09 06	37.200	3583	SPUZZUM CREEK SNOW PILLOW
CWRQ2	2010-02-09 06	36.930	5141	CHILLIWACK RIVER SNOW PILLOW
LLSC1	2010-02-09 06	36.820	8274	LAKE LOIS
MRSW1	2010-02-09 06	36.500	5413	MORSE LAKE
TENQ2	2010-02-09 06	36.500	5482	TENQUILLE LAKE
LYLW1	2010-02-09 06	35.800	6516	LYMAN LAKE
AZUQ2	2010-02-09 06	35.750	5331	AZURE RIVER
LELC1	2010-02-09 06	34.600	9606	LEAVITT LAKE
REDQ2	2010-02-09 06	34.200	6818	REDFISH CREEK
HRSC1	2010-02-08 12	34.100	8609	HORSE MEADOWS
MOLQ2	2010-02-09 06	33.620	4941	MOLSON CREEK SNOW PILLOW
TSAQ2	2010-02-09 06	33.460	4482	TSAL CREEK
MDBC1	2010-02-08 12	33.100	6703	MIDDLE BOULDER 1 SNOW COURSE
PCRW1	2010-02-09 06	31.900	4629	PARK CREEK RIDGE
CAYW1	2010-02-09 06	31.800	5364	CAYUSE PASS
MRTW1	2010-02-09 06	31.000	3550	MARTEN RIDGE
VNVC1	2010-02-08 12	31.000	6752	VAN VLECKV_REMARKS=
WHSW1	2010-02-09 06	30.800	5007	WATERHOLE
MELC1	2010-02-08 12	30.300	7513	MEADOW LK SNOW COURSE

Home

Snow Information
National Analyses
Interactive Maps
3D Visualization
Airborne Surveys
Satellite Obs
Forecasts
Data Archive
SHEF Products

Observations near
City, ST

Science/Technology
NOHRSC
GIS Data Sets
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Imagery

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Staff

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Snow Climatology
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Comments!





National Weather Service National Operational Hydrologic Remote Sensing Center

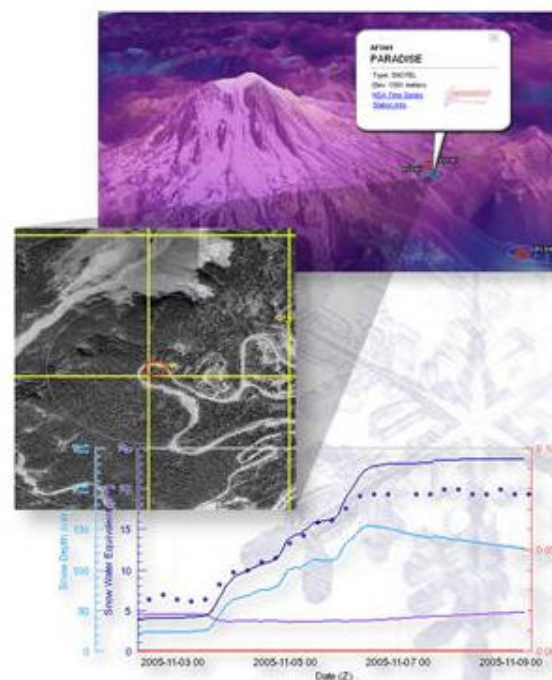
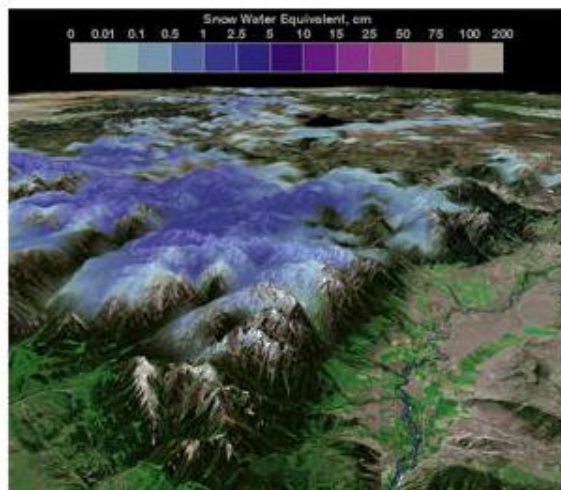
weather.gov

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NATIONAL SNOW ANALYSES IN 3D

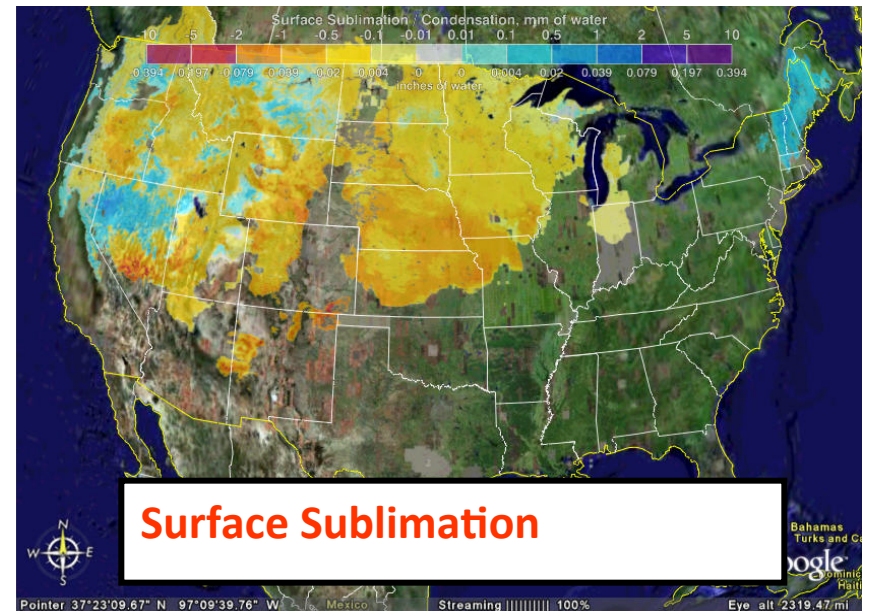
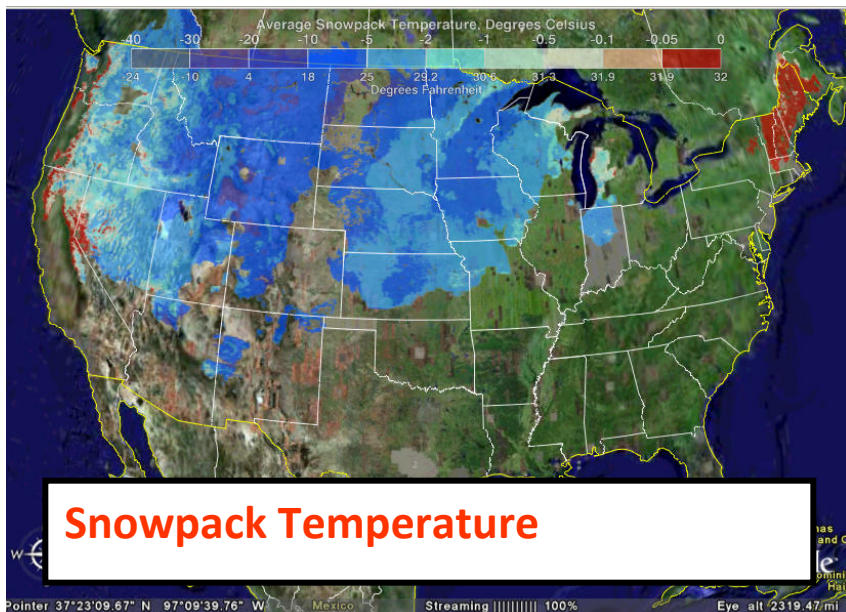
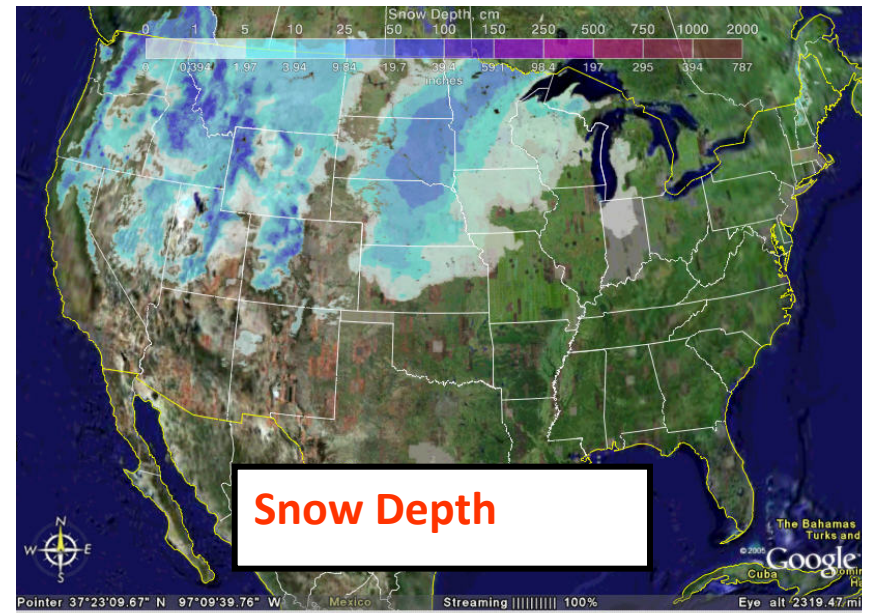
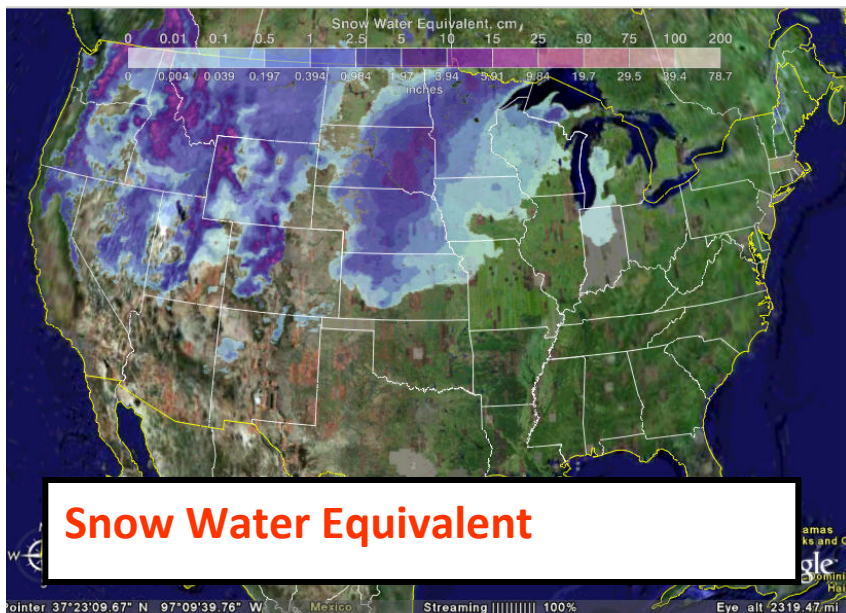
3D visualization - it's a key to understanding the National Snow Analyses.

- Fly over terrain
- Explore snow reporting stations
- Get the latest snow observations

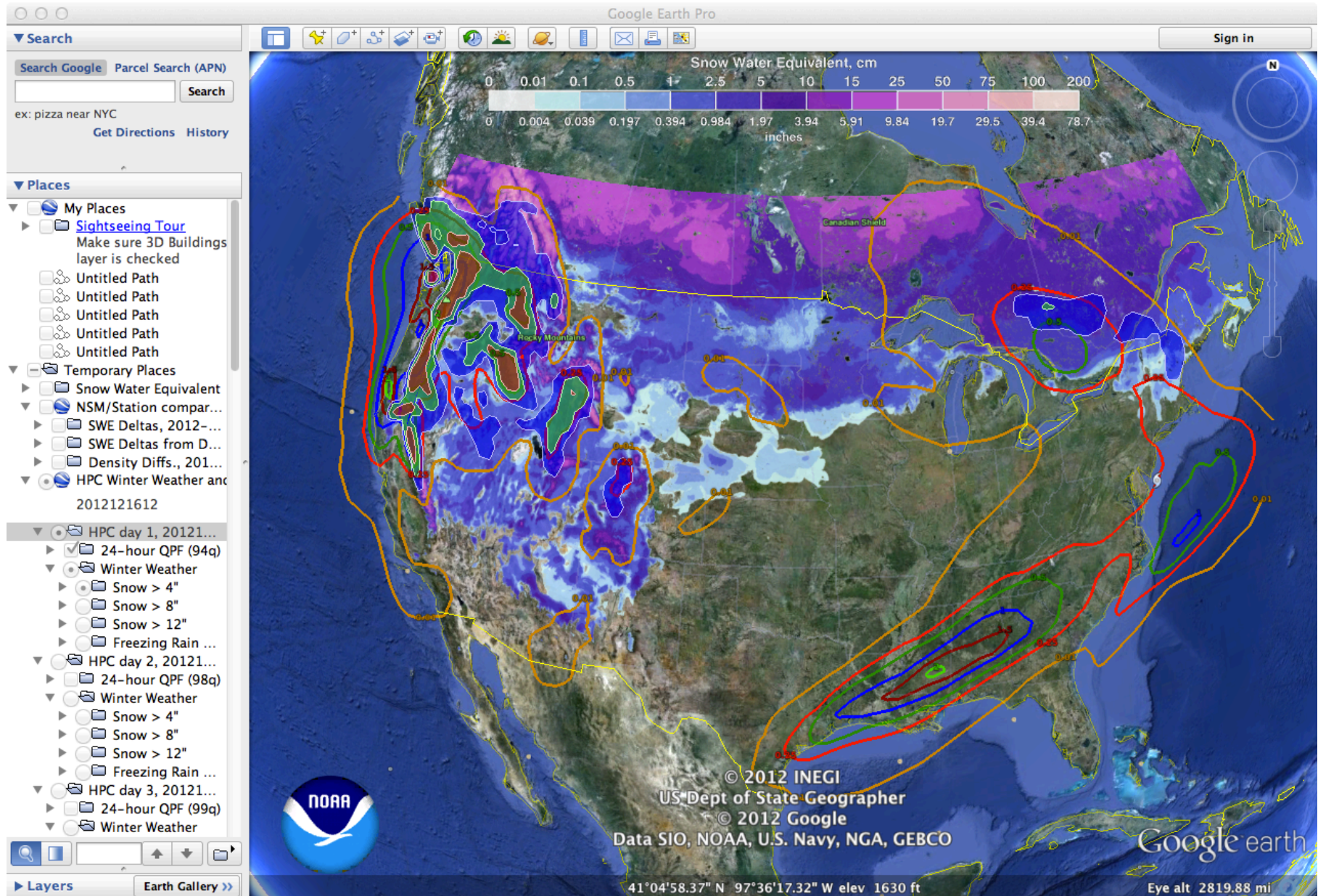


Visualize Snow

National Snow Headlines



HPC Snow Forecast



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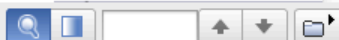
ex: pizza near NYC

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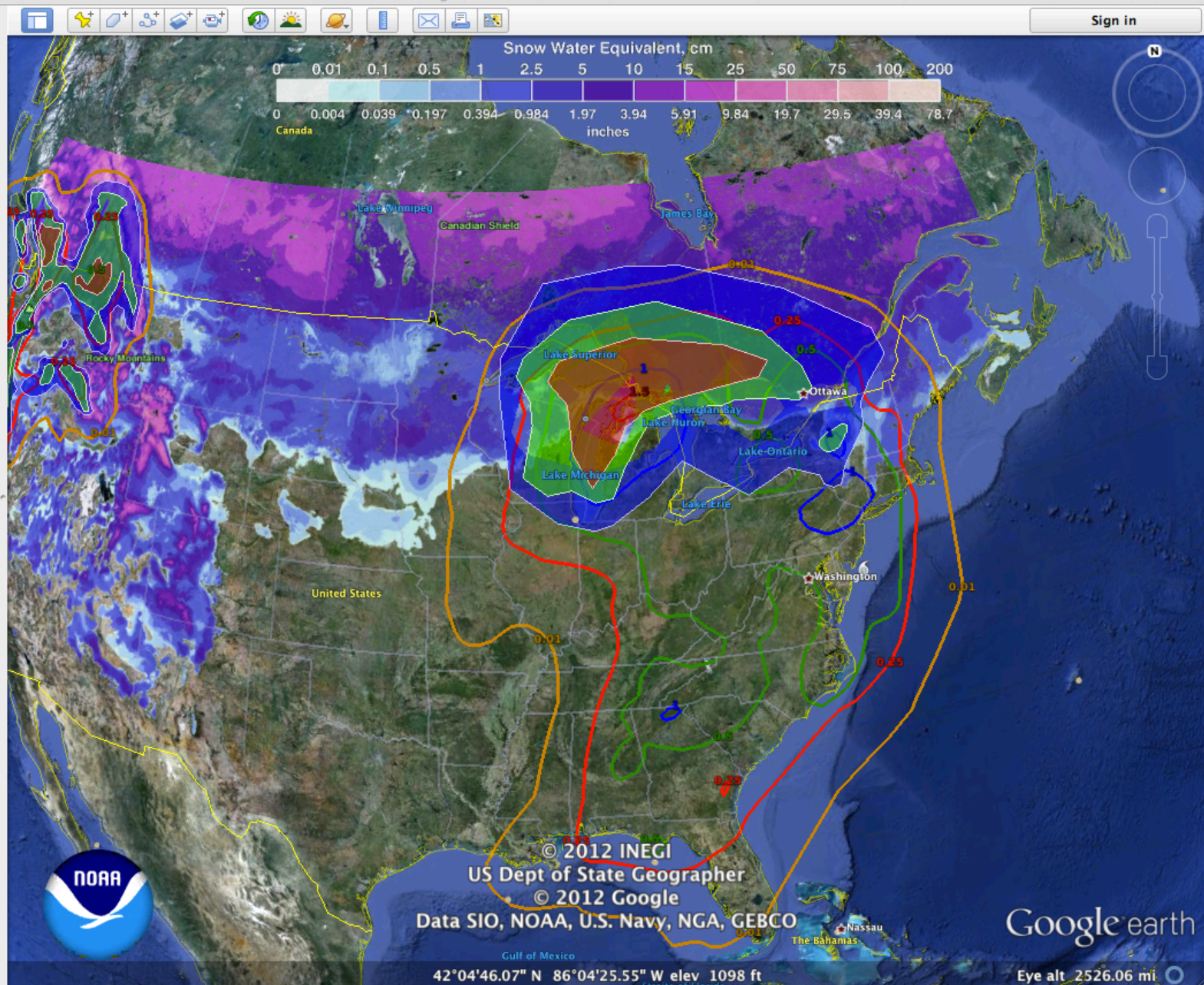
- ▶ ☐ Snow > 4"
- ▶ ☐ Snow > 8"
- ▶ ☐ Snow > 12"
- ▼ ☐ HPC days 4-5, 20...
- ▶ ☐ 48-hour QPF (p4...
- ▼ ☒ HPC Winter Weather and 2012121812
- ▼ ☐ HPC day 1, 20121...
- ▶ ☐ 24-hour QPF (94q)
- ▼ ☐ Winter Weather
- ▶ ☐ Snow > 4"
- ▶ ☐ Snow > 8"
- ▶ ☐ Snow > 12"
- ▼ ☐ HPC day 2, 20121...
- ▶ ☐ 24-hour QPF (98q)
- ▼ ☐ Winter Weather
- ▶ ☐ Snow > 4"
- ▶ ☐ Snow > 8"
- ▶ ☐ Snow > 12"
- ▼ ☐ HPC day 3, 20121...
- ▶ ☒ 24-hour QPF (99q)
- ▼ ☐ Winter Weather
- ▶ ☐ Snow > 4"
- ▶ ☐ Snow > 8"
- ▶ ☐ Snow > 12"
- ▼ ☐ HPC days 4-5, 20...
- ▶ ☐ 48-hour QPF (p4...
- ▼ ☐ NSM/Station compar...
- ▶ ☐ SWE Deltas, 2012-...
- ▶ ☐ SWE Deltas from D...
- ▶ ☐ Density Diffs., 201...
- ▼ ☒ NOHRSC Snow Model S...

2012-12-18



Layers

Earth Gallery >>



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ex: pizza near NYC

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Density Diffs., 201...

NOHRSC Snow Model S...

2012-12-18

Snow Water Equivalen

2012-12-18 06

Scaled Snow Precipita

24-Hour Total Ending
2012-12-18 06

Scaled Non-Snow Pre

24-Hour Total Ending
2012-12-18 06

Average Snowpack Te

24-Hour Average
Ending 2012-12-18

Snow Melt

24-Hour Total Ending
2012-12-18 05

Snow Cover

2012-12-18 06

Snow Depth

2012-12-18 06

Snow Density

2012-12-18 06

Snow Water Equivalen

24-Hour Change
Ending 2012-12-18

Surface Sublimation /

24-Hour Total Ending
2012-12-18 05

Blowing Snow Sublim

24-Hour Total Ending
2012-12-18 05

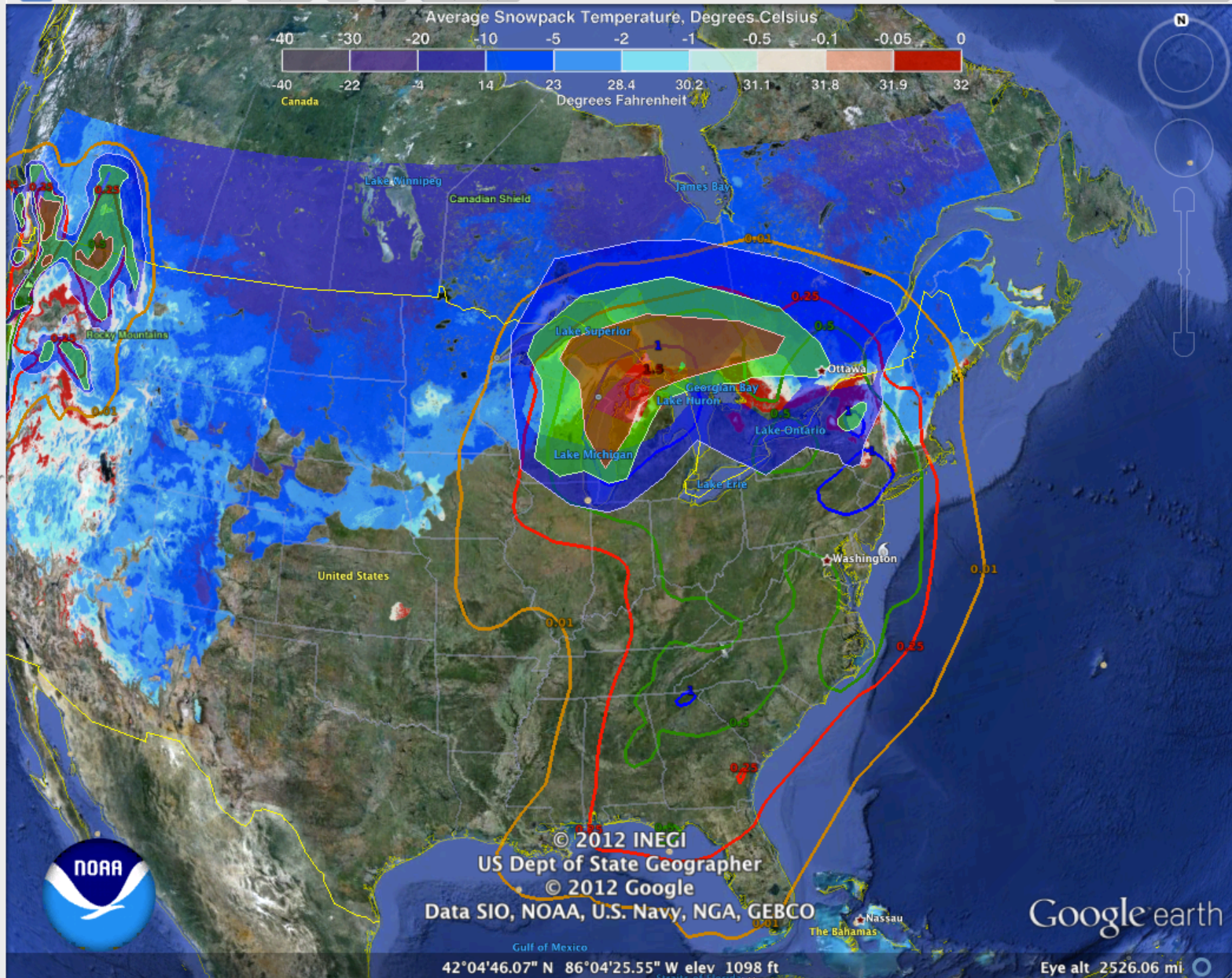


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Google maps

http://www.nohrsc.noaa.gov/snow_model/GE/20110112/nohrsc_ns ▼

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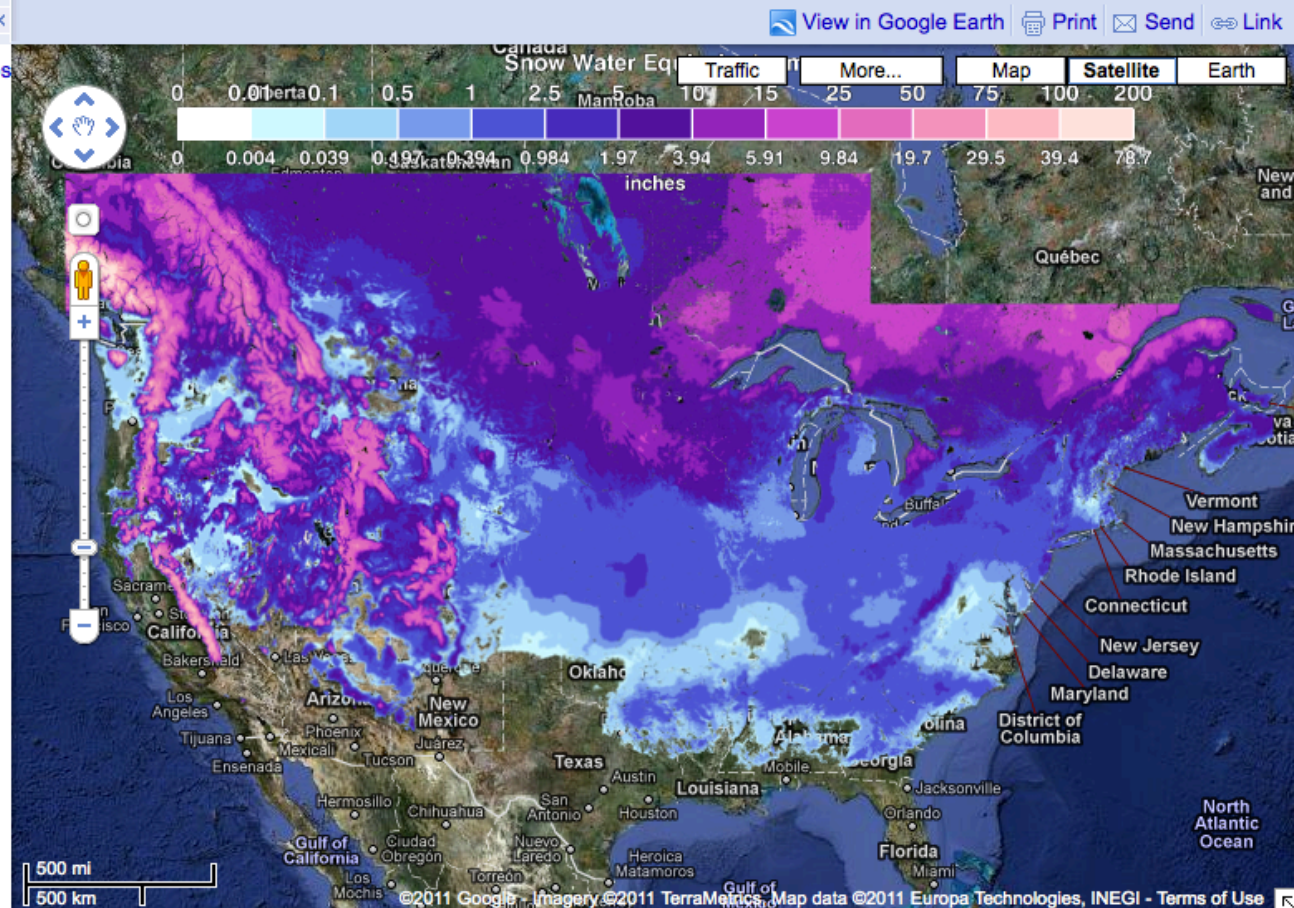
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NOHRSC Snow Model Snapshot
2011-01-12


- ☒ Snow Water Equivalent
- ☐ Scaled Snow Precipitation
- ☐ Scaled Non-Snow Precipitation
- ☐ Average Snowpack Temperature
- ☐ Snow Melt
- ☐ Snow Cover
- ☐ Snow Depth
- ☐ Snow Density
- ☐ Snow Water Equivalent
- ☐ Surface Sublimation / Condensation
- ☐ Blowing Snow Sublimation



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Nearest observations to
Salt Lake City, UT

Note: these data are unofficial and provisional.

Location and Date

Enter your "City, ST"

Closest 5 observations near Salt Lake City, UT
40.76°N, -111.89°W (Elevation: 4262 ft) Latest between 2012-12-15 06:00 Z
and 2012-12-16 06:00 Z

Raw Snowfall Observations

Station ID	Name	Elev. (ft)	Raw Snowfall (in)	Duration (hours)	Date (UTC)	Distance
8921O_MADIS	SALT LAKE CITY 3.3 E, UT	4577	2.80	24	2012-12-15 14	1.6 mi ENE
3514H_MADIS	SALT LAKE CITY 2.1 SE, UT	4321	2.50	24	2012-12-15 14	1.7 mi SE
1565R_MADIS	SOUTH SALT LAKE 2.9 NE, UT	4344	2.20	24	2012-12-15 14	1.8 mi ESE
4292S_MADIS	SALT LAKE CITY 3.6 SE, UT	4606	4.00	24	2012-12-15 14	3.6 mi ESE
3519H_MADIS	SALT LAKE CITY 4.9 SE, UT	4633	5.40	24	2012-12-15 15	4.5 mi ESE

Snow Depth Observations

Station ID	Name	Elev. (ft)	Snow Depth (in)	Date (UTC)	Distance
3514H_MADIS	SALT LAKE CITY 2.1 SE, UT	4321	2.50	2012-12-15 14	1.7 mi SE
1565R_MADIS	SOUTH SALT LAKE 2.9 NE, UT	4344	2.00	2012-12-15 14	1.8 mi ESE
NHMU_MADIS	NATURAL HISTORY MUSEUM UTAH	5082	3.68	2012-12-16 05	3.6 mi E
KSLC	SALT LAKE CITY INTERNATIONAL AIRPORT	4222	1.00	2012-12-15 18	4.3 mi WNW
SLC	SALT LAKE CITY INTL ARPT	4219	0.00	2012-12-16 00	4.3 mi WNW

Snow Water Equivalent Observations

Station ID	Name	Elev. (ft)	Snow Water Equivalent (in)	Date (UTC)	Distance
3514H_MADIS	SALT LAKE CITY 2.1 SE, UT	4321	0.33	2012-12-15 14	1.7 mi SE
9190H_MADIS	WEST VALLEY CITY 2.5 ESE, UT	4334	0.33	2012-12-15 15	6.7 mi SW
LMSU1	LOUIS MEADOW	6772	3.90	2012-12-16 05	8.2 mi ENE
7530O_MADIS	SANDY 2.0 NE, UT	4649	0.85	2012-12-15 14	11 mi SSE
PCRU1	PARRISH CREEK	7795	5.50	2012-12-16 05	12.6 mi NNE

Find: ☐ Match case

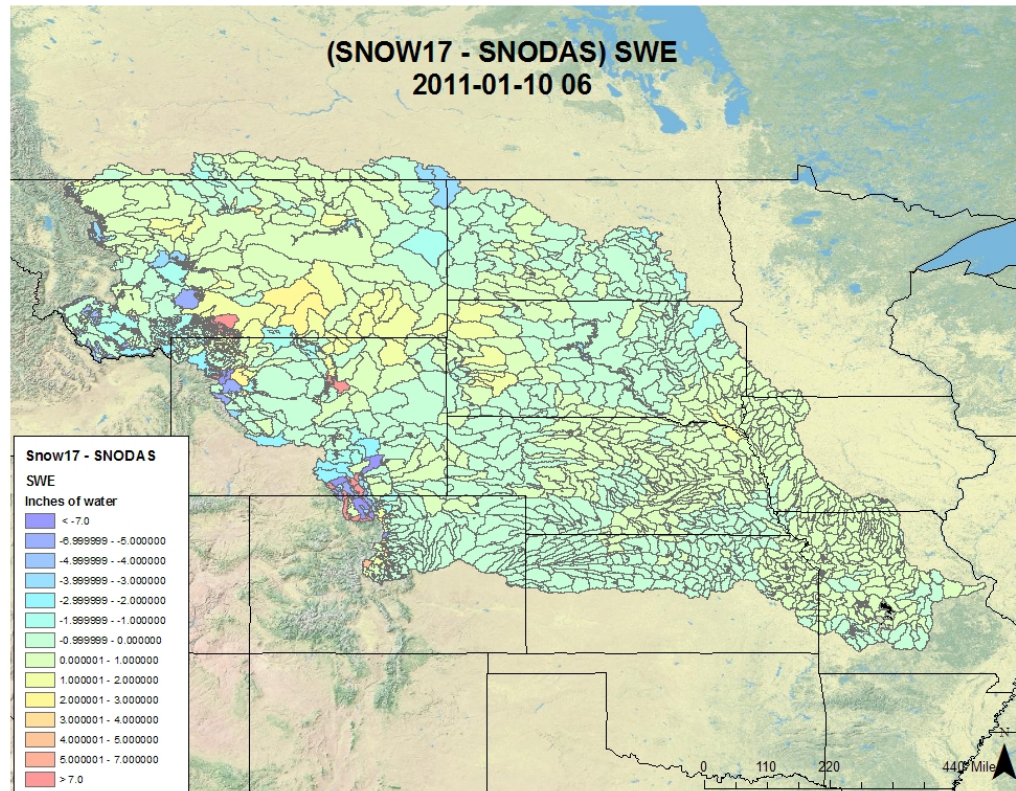
New for 2013 Snow Season

- Forecast products are now operational from 24 to 72 hours
- Adding basin average SHEF products, including forecasts.
 - We are now generating 6 hourly products per RFC request.
 - These are available over AWIPS or web
- 6 hourly GRIB2 products - Available via ftp / soon over AWIPS
- Accumulated Melt Grids and SHEF products.
- Additional Snow Data ingestion to support assimilation in Southern Canada including portions of Quebec, The Great Lakes Drainage, The Souris, and the Red River Valley.

New Collaboration!

Weekly teleconferences started 3 years ago and expand each year.
Forecast offices are welcome to participate.

New weekly teleconferences within Western Regions possibly CBRFC and NWRFC ?





National Weather Service National Operational Hydrologic Remote Sensing Center

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3D Visualization
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NOHRSC Science and Technology

Mission Statement

The National Operational Hydrologic modeled hydrology products for the enhancement of the national eco

NOHRSC airborne, satellite, and mo agencies, the private sector, and the the nation. The NOHRSC produces equivalent, snow depth, snow pack t snow, modeled and observed snow i and time-series for selected model

Overview

The National Operational Hydrologic airborne, and satellite snow observat data are used along with estimates o to generate the operational, daily NO NOHRSC snow model is an energy-s snow model run operationally at 1-kr Ground-based and remotely-sensed state variables. NOHRSC NSA output alphanumeric, time-series, and gridd maps for nine snowpack characteris snowpack characteristics, (3) text su and (5) selected gridded snow produ equivalent, snow depth, surface and sublimation, snow-surface energy ex

NWS NOHRSC Policy and Snow

- NOHRSC Abbreviations and
- NOAA's Hydrology Program
- NWS Instruction 10-931: Nat Sensing Center; 2005 March
- Requirements for snow data, hydrologic services program,
- Recommendations For Makin
- Recommendations For Makin

NOAA's National Snow Analyse

- NOAA's National Snow Anal



SNOW BOARD

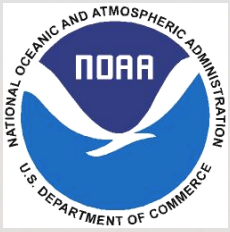
A look at the importance of snow information

Under the umbrella of the NWS, the National Snow Analysis (NSA) provides valuable snow accumulation information

Water from melting seasonal snowpacks is a critical water resource in many mid-latitude regions of the world. In western USA, snowmelt from mountain basins has historically provided 70-90% of the annual run-off, and the winter snowpack acts as a reservoir to store water for spring and summer delivery to soils and streams. Studies have estimated the economic impact of snow in the USA at several hundred billion dollars per year. The value of water from spring snowmelt can exceed US\$348 billion per year. The value of snow-related tourism in the USA exceeds US\$7.9 billion per year, and snow removal from streets and highways in the USA exceeds US\$2 billion annually.

Given the significant impact that snow can have on our lives and communities, there is an obvious need to monitor the snowpack accurately and consistently to meet a broad range of user interests and requirements. The National Weather Service (NWS), which issues river and flood forecasts, and provides hydrometeorological data and products to support the nation's water resource managers, established the National Operational Hydrologic Remote Sensing Center (NOHRSC) in Chanhassen, Minnesota, as its center of expertise in satellite and airborne remote sensing and geospatial data analysis.





Questions?

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